

# The Iron Age

A Review of the Hardware and Metal Trades.

Published every Thursday Morning by DAVID WILLIAMS, No. 10 Warren Street, New York.

Vol. XVII: No. 9.

New York, Thursday, March 2, 1876.

\$4.50 a Year, Including Postage.  
Single Copies, Ten Cents.

## Breaking Large Masses of Iron by Blasting with Dynamite.

It is a well known fact that in almost all large iron works, especially Bessemer works, thousands of hundredweights of iron have lain for years useless, for the reason that the pieces are too large to be broken with the appliances at hand, and in their present form cannot be remelted. Such masses are dead capital, and are only in the way.

In the works at Ternitz, in lower Austria, a number of trials were made recently by Mr. J. Trautl, in blasting these masses with dynamite, in which it was clearly established that it is no longer necessary to let these large masses of iron lie idle on account of their great size.

From the following particulars of these blasts correct conclusions can be drawn for similar work, and they are, therefore, of value to the public—which cannot be said of all former labors of this kind. We give first a description of the mass of iron to be broken, and then particulars as to the methods employed in blasting them.

### I. BESSEMER STEEL BLOCK OF 1250 KILOS (2762½ lbs.) WEIGHT (FIGS. 1-4).

In this block the holes *a* were each bored to the depth of 237 mm. (9½ in.), and *b* 158 mm. (6¼ in.).

**First Blast.**—The holes *a* were each loaded with 233 grms. (8½ oz.) of dynamite, and holes *b* each with 166 grms. (5½ oz.), and all simultaneously fired by electricity. The effect was simply the enlargement of the lower part of the holes.

**Second Blast.**—The holes *a* were each charged with 533 grms. (18½ oz.) and *b* with 400 grms. (14½ oz.), and fired as before. The explosion tore away the part of the block in front of the holes *a*, the remaining portion showed deep fissures; see Fig. 3.

**Third Blast.**—The holes *b* were each charged with 150 grms. (5½ oz.), and fired by electricity. The two side pieces of the block marked by the fissures were torn away; see Fig. 4.

**Fourth Blast.**—The hole *c* was drilled to the depth of 133 mm. (5¼ in.) and charged with 83 grms. (2½ oz.). The result of the firing was the enlargement of the hole; see Fig. 4.

**Fifth Blast.**—The hole *c* was charged with 100 grms. (3½ oz.). The explosion split the block in the direction *b c b*. There were, therefore, five blasts required to break up the block, the first three of which were combined, the last two simple discharges. Twelve charges were used, by which the block was broken into 18 pieces. The largest piece weighed 400 kilos (884 lbs.), but could be melted. The cost of breaking up this block of steel was as follows:

Drilling holes (222 mm.)	.....	\$10.50	(\$5.00)
347 grms. dynamite	.....	5.04	(2.44)
3 hours' labor of 4 laborers	.....	1.50	(.75)
10 electrical igniters	.....	.60	(.30)
3 explosive caps	.....	.08	(.04)
Quita percha, wire, &c.	.....	.14	(.07)

Total cost.....\$17.81 (\$8.63)

For each 50 kilos (110½ lbs.) of broken steel the cost of drilling (36.8 mm.), was 42 kr. (20 cts.) for explosive materials (136 grms. dynamite), 30 kr. (9.7 cts.). The total cost was 71.2 kr. (34½ cts.). Taking the value of 50 kilos of raw steel at 3 fl. (\$1.45) the breaking up of the block would leave a profit of 2 fl. 28.8 kr. (\$1.11), that is, 3 fl. of dead capital represented after breaking up an available capital of 2.33 fl.

### II. COUNTER WEIGHT OF CAST IRON, WEIGHING 6000 KILOS (13,260 lbs.) (FIGS. 5 AND 6.)

Six holes were drilled, *a* and *b*, each 431 mm. in depth, *c* each 237 mm.

**First Blast.**—The holes *a* were each charged with 266 grms. dynamite, and fired by electricity. Part I was torn off on the line of the two holes *a*, and broken into many pieces.

**Second Blast.**—The holes *b* were each charged with 366 grms. dynamite, and fired by electricity. Part II, was broken off in the direction of the two holes, and broken in pieces.

**Third Blast.**—The holes *a* were also charged with 266 grms., and fired as the others. Through this explosion part III was torn through its entire height, and broken up into many pieces.

In three blasts, using six charges, the whole mass was broken into 14 large pieces—50 to 600 kilos weight—and numerous small ones, which together weighed about 750 kilos. The cost of breaking was as follows:

Drilling holes (215 mm.)	.....	\$12.30
Dynamite (1866 grms.)	.....	3.55
16 hours' labor for 3 laborers	.....	3.40
6 electrical igniters	.....	.56
Wire, &c.	.....	.61

Total cost.....\$19.22

The cost of breaking up the mass per 50 kilos was 10.35 kr. for drilling holes (18 mm.), 2.19 kr. for dynamite (133 grms.); in all, say, 12.54 kr. Taking the value of the iron at 1 fl. per 50 kilos leaves a net gain of .34 fl.

### III. AND IV. TWO IRON BALLS OF 1500 KILOS (3315 lbs.) WEIGHT EACH (FIGS. 7 AND 8.)

The holes *a* were drilled in the center to the depth of 474 mm., and charged with 233 grms. dynamite. After the blast the under portion of the mass was found to be split from the bottom of the hole in the direc-

tion *o m, o n, o p* and *o q*, while the upper ball-shaped part was broken into three pieces. The second ball was charged in the same way, and exploded with nearly the same results. The breaking of each ball cost:

Drilling holes (474 mm.)	.....	\$12.70
Dynamite (333 grms.)	.....	.38
1 explosive cap	.....	.05
4 hours' labor, 2 laborers	.....	.75
Quickmatch	.....	.15

Total.....\$13.96

Per 50 kilos iron, it was, therefore, necessary to drill a hole 16 mm. in depth, value, 9 kr., and expend 8 grms. dynamite, 130 kr. The total cost per 50 kilos was 13.2 kr. From these blasts a very considerable profit was realized.

### V. BESSEMER STEEL BLOCK WEIGHING 4000 KILOS (FIGS. 9 AND 10.)

A hole was drilled 474 mm. in depth in the direction of the axis of the mass.

Drilling holes, 22 mm. in depth, 24.8 kr.; dynamite, 71 grms., 11.3 kr. Per 50 kilos the cost may be set down at 4.82 fl.

An examination of the various articles after blasting, showed that the steel blocks were of medium hardness, but very tough. The shape of the first steel block was very unfavorable for blasting. The cast iron was middling hard, and rather brittle. In the second trial it was easily broken up, as the texture was not perfectly homogeneous.

These five trials conclusively show that such large masses of iron or steel may be made available for use again at a comparatively little expenditure of time and money. Even the largest masses may be broken up by a person skilled in blasting, without endangering buildings, etc., situated close by. It may be even asserted that salamanders in the blast furnace can be

If a number of holes are necessary for the breaking up of the piece, they should be fired simultaneously, as the effect is vastly better than that of successive separate explosions. This can only be done by electricity, but the apparatus for this purpose is so cheap that it will not form a serious item of expense. After the holes are charged the mass should be covered with sand and earth and heavy timbers. If it is placed in a pit this is an easy matter; if, however, the mass lies upon the surface, greater care must be exercised. A greater number of weak charges are preferable to fewer strong ones. The most important of all is the locating of the holes, for, as they form the largest item of expense, it is desirable to get along with as few as possible, and they should be so placed as to break the iron up small enough for use.—*Oester. Zeitschrift f. Berg u. Huettenwesen.*

contains one-half to 2 and more per cent. of phosphorus. The ordinary puddling process reduces the amount of phosphorus in the wrought iron to 0.7 or 0.8 per cent. Still, even this is too much if such material is to be employed in large quantities for steel rails. An effective process for dephosphorizing iron, if it were at the same time cheap, would offer a substitute to those districts which have been injured by the superceding of iron rails and cast steel previously manufactured there. On the other hand, the agriculturists would be greatly benefited by having furnished to them the phosphates which pollute the area of their neighborhood. It is estimated that the annual iron production of Cleveland alone contains about 3000 tons of phosphorus, which reduces their value, while the farmers would pay more than \$1000 for this valuable material. It is easy to see what interest attaches to the solution of such a problem, and to the pains already expended on it.

The phosphorus in iron ore is certainly there as a phosphate, but in general none, or very little, of it is combined with iron as phosphate of iron, but with lime and alumina. Phosphates of lime and alumina are, however, soluble in water containing common salt, chloride of magnesium, nitrate of soda and ammonia salts, as well as in acids, even when very dilute. As long ago as 1865 experiments were made at Isderbuette to remove the phosphorus by means of dilute muriatic acid; in this way the quantity of phosphorus was reduced from four to one-half per cent. Yet, on a large scale, the process did not work economically, and hence was given up. Jacob's method, where sulphurous acid is employed, had not been actually developed on a practical scale.

The ores used at the Adalbert Furnace, in Kladno, contained, after roasting, 1½ per cent. phosphorus. The ore was broken up in pieces of 4 to 7 ounces each and roasted in vertical furnaces, which presented no special features. It was then put into large rectangular basins, the sides of which were of wood and held 10,000 cwt. The pyrites were roasted in furnaces with horizontal hearths, like those used in making sulphuric acid; the sulphurous acid thus generated was condensed by water in a special apparatus and then conducted into the leaching basins; this solution remained in contact with the ore for 24 hours, was run off and the ore left to drain. The liquor is passed through a coil of iron pipe like that employed to heat the blast, and warmed to 176° or 194° Fah. The excess of sulphurous acid gas is driven out and about 30 per cent. of the original quantity is recovered. The liquor now discharges into a reservoir, where the phosphate of alumina settles as a white, impalpable powder, having as an average the following composition:

Phosphoric acid	.....	24.5
Alumina	.....	34.3
Oxide of iron	.....	2.0
Silica	.....	2.1
Water	.....	36.7
Sulphuric acid	.....	.94

99.8

The furnace officers state that the average composition of the roasted ore before and after dephosphorizing is as follows:

	Before.	After.
Iron	Per cent. 43	Per cent. 46
Alumina	14 to 18	6 to 8
Silica	14 to 16	20 to 22
Phosphorus	1½	¼

The lime which reached 4 per cent. falls, according to Gautier's analysis, to about 1 per cent. During the working Gautier took out samples, and found on analysis the following percentage of phosphorus in each:

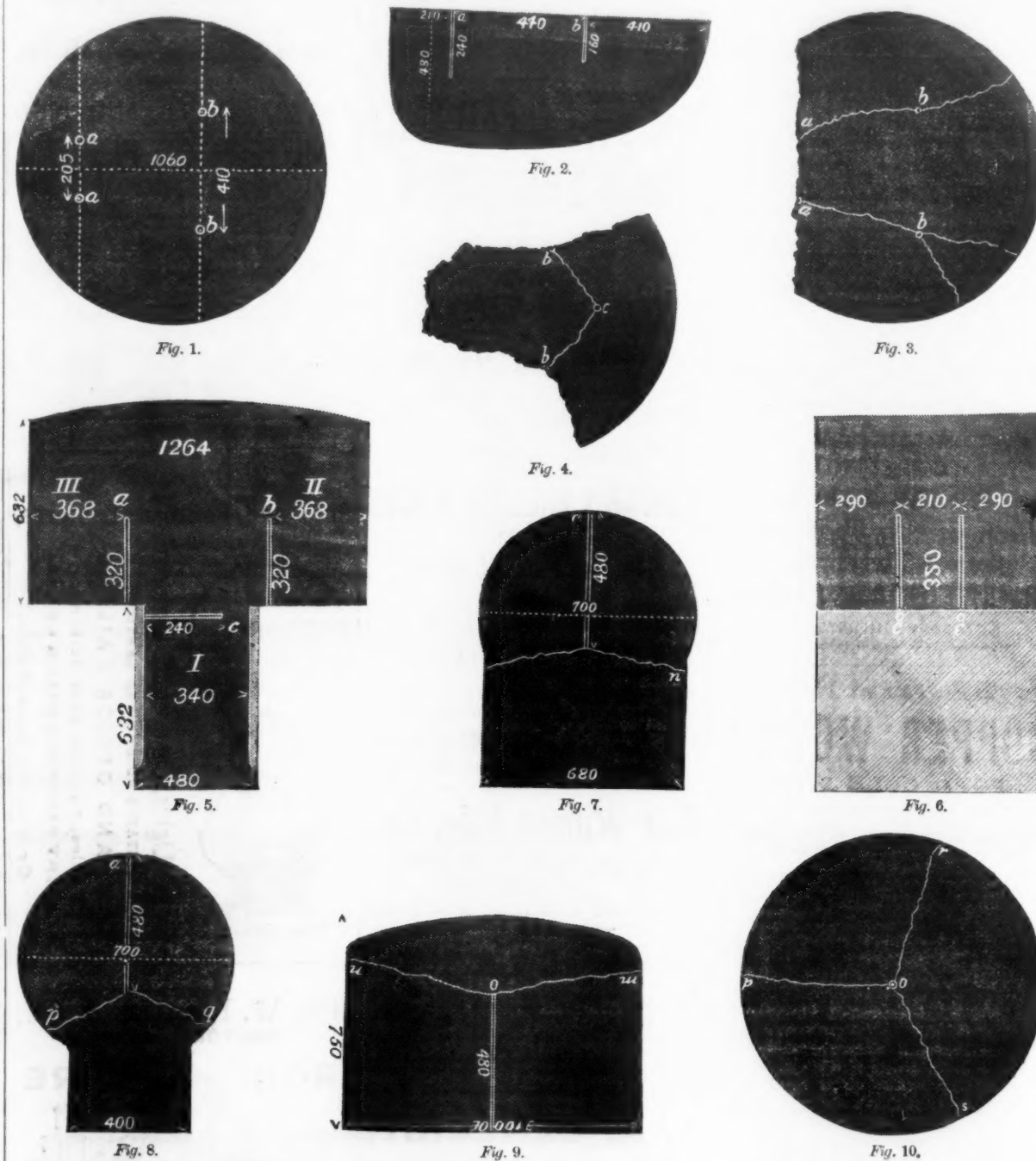
	Crude ore.	Ore.	Cast iron.	Puddled iron.
Ore treated with sulphurous acid	11 to 17	17 to 21	0.8 to 0.9	0.8 to 0.9
Ore washed with water	0.2 to 0.3	0.5 to 0.6	0.1 to 0.2	0.1 to 0.2

An important dephosphorization was observed when the ore was merely washed with clean water. As the ore also contains pyrites, on roasting, sulphuric acid and sulphates are formed, which, in the presence of water, dissolve the phosphates. The purpose of this simple leaching is the production of a strong foundry pig iron, rich in carbon. The sulphur enables it to dissolve the carbon, and renders the formation of a very gray pig almost impossible.

It is difficult in so new a process to determine the cost of carrying it out, without referring more or less to the inventor. From two different sources Gautier obtained the following data, which agree tolerably. The cost of leaching a ton of 2200 lbs. of roasted ore was a little over \$10, as follows:

125 kilos pyrites from Siegen	.....	\$10.00
Coal and labor	.....	\$10.00

Gautier is of the opinion that dephosphorization by Jacob's or other similar method would not be profitable, except in certain special cases, on account of the difficulty of treating such enormous masses of ore, as working on a large scale would require, in the wet way, much time would be lost in drying it sufficiently, while the phosphorus would not be completely removed.—*D. I. Zeit.*



DIAGRAMS ILLUSTRATING ARTICLE ON BREAKING LARGE MASSES OF IRON BY BLASTING WITH DYNAMITE.

**First Blast.**—The hole was charged with 333 grms. dynamite and fired. The result was a considerable enlargement of the lower part of the hole.

**Second Blast.**—606 grms. of dynamite were used. The explosion caused two deep fissures, extending from the hole to the circumference.

**Third Blast.**—Same charge used as last. The cylindrical portion was completely separated from the lower part and broken into 3 pieces in the direction *o p, o r* and *o s*. The cost was:

Drilling (474 mm.) holes	.....	\$15.40
Dynamite (1866 grms.)	.....	3.55
3 explosive caps	.....	.05
16 hours' labor, 4 laborers	.....	3.40
Quickmatch	.....	.15

Total.....\$19.22

The 4 pieces each require another blast to reduce them to a size suitable for melting. There are, therefore, holes 316 mm. deep to be bored in each piece, with two blast for each hole, the first with 333 grms., and the second, with 667 grms. dynamite. Taking these into account, the cost of breaking up the block may be estimated as follows:

Drilling holes (1738 mm.)	.....	\$19.80
Dynamite (5666 grms.)	.....	9.16
11 explosive caps, &c.	.....	1.10
48 hours' labor for 4 laborers	.....	9.00

Total.....\$39.06

For each 50 kilos of steel are necessary:

broken up with inconsiderable damage to the furnace. These trials also show the important bearing the form of the mass of iron has upon the arrangement of the holes to be bored, and the impossibility of laying down any rule, or of saying that for each 50 kilos of iron to be broken there must be *m* mm. of hole drilled, *n* grms. of dynamite used for charges, or that the total cost will be *x* florins. It may, however, be safely calculated that the breaking up of the mass will not cost more than 20 to 25 per cent. of the value of it.

A few brief directions are given below, in order that engineers of iron works may easily make such trials for themselves. The use of dynamite, explosive caps, quick matches and the electric lighter will be considered as familiar to the engineer.

Where it can be done without too great cost, the mass to be broken should be placed in a pit expressly prepared for it, which should be made deep enough for the iron to be one meter below the surface. When it is impossible to move a large body, it can be blasted where it lies, even if within a building. The holes are drilled with a common ratchet drill, using a drill large enough to make a hole 26 mm. (1.16 in.) in diameter. When it is convenient to use power in drilling, it is, of course, to be preferred.

## Jacob's Method for Dephosphorizing Iron Ores.

A Bohemian furnace manager named Jacob succeeded in purifying phosphoric iron ores by treating them with sulphurous acid and then leaching them, so that a faultless iron was made from an ore which yielded, before treatment, a cast iron containing 2 per cent. and upward of phosphorus. A French engineer, Gautier by name, who has recently studied this process at Kladno, gave a full account of it in the Parisian Society of Civil Engineers. The problem, still highly important, notwithstanding new processes have been devised which permit rail steel to contain from 0.3 to 0.4 phosphorus when the carbon is reduced to 0.1 or 0.3 per cent.

Unfortunately, the most important, as well as the most numerous, deposits of iron ore do contain phosphorus, and great metallurgical improvements are required in order that the different kinds of steel used most in the arts can be made from such ores. There are a great number of these ores. The mines of Cleveland, Luxemburg, Lothringen, Bavaria, Hanover, Bohemia, and many other localities, are of this character. The cast iron made from them



**Metals.****ANSONIA  
BRASS & COPPER CO.**

19 and 21 Cliff Street,

(Adjoining Office of Phelps, Dodge &amp; Co.)

Sheet Brass, Polished Brass, Brass Door Halls, Brass Wire, Hayden's Patent Brass Kettles, Brass Tubing, Lamp Burners, Gun Burners, Sheet Copper, Planished Copper, Copper Rivets & Burs, Brassers' & Bolt Copper, Brassers' Rivets, Copper Tubing, Copper Bottoms, Copper Wire, Iron Wire, Fence Wire.

A large variety of Wood and Bronze Case Clocks.

MANUFACTURERS AT ANSONIA, CONN.

**Phelps, Dodge & Co.,**

IMPORTERS OF

**TIN PLATE,**

Sheet Iron, Copper, Pig Tin, Wire, Zinc, etc.

MANUFACTURERS OF

**COPPER and BRASS.**

Cliff St., bet. John and Fulton,

NEW YORK.

**A. A. THOMSON & CO.**

Importers and Dealers in

**Tin Plate, Sheet Iron,**

ZINC, COPPER, WIRE,

Block Tin Spelter, Solder, &amp;c.

Nos. 213 and 215 Water and 119 Beekman Sts.,

NEW YORK

P. O. Box 61.

**T. B. CODDINGTON & CO.,**

95 &amp; 97 Cliff St., New York.

Importers of

**TIN PLATES,**

And METALS of all descriptions.

**SCOVILL MFG. CO.,**

419 &amp; 421 Broome St., New York.

MANUFACTURERS OF

SHEET AND ROLL BRASS, BRASS AND COPPER WIRE, GERMAN SILVER, BRASS BUTT HINGES, KEROSENE BURNERS, METAL BLANKS CUT TO ORDER, CLOTH AND METAL BUTTONS, in every variety.

**PHOTOGRAPHIC GOODS.**

MANUFACTURERS:

Waterbury, Conn., New Haven, Conn., New York City.

**EVANS & ASKIN,**

BIRMINGHAM ENGLAND.

Refiners of Nickel and Cobalt.

SOLE AGENTS

**VAN WART & MCCOY,**

134 &amp; 136 Duane Street, N. Y.

Nickel and Cobalt always in stock.

**THE RICHARDS  
Hardware Co.,**

47 Murray Street, N. Y.

Manufacturers of Richards' Patent Porcelain-head Picture Nails; also, Porcelain Picture, Drawer, Shutter, and Door Knobs, etc., etc.

Importers of German Brass Goods, also, China, Gilt, Steel, and Silvered Furniture Nails Wire Nails etc., etc.

We particularly invite the attention of large buyers to our Patent Picture Nails and Knobs being a specialty with us, we offer satisfactory discounts on good orders.

**W. R. OSTRANDER,**

Manufacturer of THE BEST IMPROVED

**ALARM SPEAKING TUBE WHISTLE,**

Speaking Tube, Elbow and Mouthpieces

Send for new Trade List.

SPEAKING TUBES FITTED UP.

19 Ann Street, NEW YORK.

SPEAKING

TUBES,

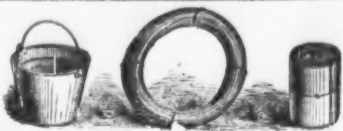
Etc.

C. A. FREDERICKS

88 Fulton Street,

New York.

PATENT ALARM WHISTLES.

**Metals.****Waterbury Brass Co.**

CAPITAL, - - \$400,000.

JOHN SHERMAN, Agent,

No. 52 Beekman Street, NEW YORK.

Mills at WATERBURY, CONN.

Sheet, Rolled and Platers' Brass,

GERMAN SILVER,

Copper, Brass and German Silver Wire,

BRASS AND COPPER TUBING,

COPPER RIVETS &amp; BURS,

BRASS KETTLES,

WASH BASINS,

Door Rail, Brass Tags &amp; Step Plates,

PERCUSSION CAPS,

POWDER FLASKS,

Metallic Eylets,

Shot Pouches,

Tape Measures, etc.

**Manhattan Brass Co.,**

Manufacturers of

Sheet Brass, Brass Wire, Copper Rivets, Copper Tubing, Spelter Tubing, Sautel Frames, Stationers' Hardware, Olmsted Patent Oilers, Prior Patent Oilers, Brighton Patent Oilers, Brass, Tin &amp; Zinc Oilers, Hurricane Lanterns, Baby Carriage Hardware, Brown's Patent Picture Nail, Pat. July 6th, 1875.

Agents for Hartford Eylet Co.

Office, 83 Reade cor. Church Sts., N. Y.

Works, 1st Ave. 27th to 28th Sts., N. Y.

J. H. WHITE, President. H. L. COE, Secretary.

STEPHEN A. MIDDLEBROOK, Treasurer.

Holmes, Booth &amp; Haydens,

49 Chambers Street, N. Y.

ESTABLISHED 1853.

CAPITAL, - - \$400,000.

Manufacturers of all kinds of

Brass, Copper &amp; German Silver,

ROLLED AND IN SHEETS.

BRASS &amp; COPPER WIRE,

Tubing, Copper Rivets &amp; Burs.

BRASS &amp; IRON

JACK CHAIN, DOOR RAIL.

German Silver Spoons.

SILVER PLATED FORKS &amp; SPOONS,

Kerosene Burners, &amp;c.

Works at Waterbury, Conn.

**BALTIMORE  
COPPER WORKS.**

POPE, COLE &amp; CO.,

Are now Purchasing

**Copper Ores**

and smelting and refining at these works, where, with

experienced workmen and unusual facilities, we are

turning out Ingot and Cake Copper of unequalled

purity and toughness.

We are prepared to buy Ores, Matte, Regulus and other

furnace material, in any quantities.

Office, 57 South Gay St., Baltimore Md.

Works at Canton,

BALTIMORE AND LAKE COPPER

Braziers Sheets &amp; Tubes.

BUYS:

Old Copper, &amp;c. Also Lead &amp; Tin Dross.

A. HARNICKELL, 22 Cliff Street, N. Y.

**JOHN W. QUINCY,**

98 William Street, New York.

**NICKEL.**

Pig Iron, Lead, Block Tin, and other

Foundry Metals. Cut Nails.

Philadelphia Nickel Plating Works.

John Hartman,

37 1-2 North Seventh Street, Philadelphia.

Electro-Nickel Plating

Of all Metallic Articles finished in the best manner.

Fuller, Dana &amp; Fitz,

METAL MERCHANTS.

Importers of Tin Plates, Pig Tin, Russia

Sheet Iron, Swedish Iron, Etc.

110 North St., BOSTON.

E. A. Williams &amp; Son,

BRASS &amp; BELL FOUNDRY

No. 107 Plymouth Street,

at Washington &amp; Warren Sts., Jersey City, N. J.

Anti Friction Metals

**Metals.****The Plume & Atwood  
Mfg. Company**

MANUFACTURERS OF

SHEET and ROLL BRASS and WIRE,

German Silver and Gilding Metal,

Copper Rivets and Burs,

Kerosene Burners,

Shoe Eyelets, Lamp Trimmings, &amp;c.

80 Chambers Street, New York.

13 Federal Street, Boston.

Rolling Mill,

Factories,

THOMASTON, Ct. WATERBURY, Ct.

**JOHN DAVOL & SONS,**

Agents for

Brooklyn Brass and Copper Co.,

Dealers in

Ingot Copper, Spelter, Lead, Tin,

Antimony, Solder &amp; Old Metals.

100 John Street, N. Y.

**W. J. HAMMOND,**

Dealer in all kinds of

**BRASS, COPPER,**

Cast Iron, Wrought Iron,

AND STEEL SCRAP. Cor. Eleventh St.

and Duquesne Way, Pittsburgh, Pa.

**Bailey, Farrell & Co****BRASS FINISHERS****FOUNDERS.****Brass Work**

FOR

Plumbers, Gas and Steam Fitters.

ENGINE BUILDERS.

Pittsburgh, - - Pa.

New Catalogue packed with first order or mailed

on receipt of eight stamps.

**EDWARD MILLER & CO.,**

Manufacturers of

**SHEET BRASS,****Brass Kettles, Lanterns**

OILERS, KETTLE EARS,

Spouts, Tinnens' Trimmings, Kerosene

Lamps, Burners, Trimmings, &amp;c.

4 Warren Street, New York.

Mill and Factories, Meriden, Conn.

**The Wilmot Mfg. Co.,**

96 John Street, Bridgeport, Conn.

50 Barclay Street, New York.

Manufacturers of

**KEROSENE BURNERS and LAMP**

TRIMMINGS, Etc.

We invite your attention to our extensive facilities for

manufacturing articles of utility, novelty, or embellish-

ment, and assure you of our ability to meet the require-

ments of every branch of trade. The increasing demand

upon us has made it necessary to extend our works, and

we now occupy the entire premises, No. 39 John Street,

and our facilities for the production of Light Metallic

Goods, in Copper, Brass or other Sheet Metals, are un-

surpassed. The use of the most approved machinery

and appliances, our long experience and established

reputation in this branch of manufacture, encourage

to solicit still more extended relations with those who

require work of this class, and we take this method of

calling your attention to our establishment.

**A. A. BENEDICT,**

Manufacturers' Agent &amp; Wholesale Dealer in

**KEROSENE BURNERS,****Lanterns, Lamps,**

And Lamp Trimmings of all Descriptions,

Shades, Chimneys, Wicks, &amp;c.

99 Chambers St., cor. Church, N. Y.

Agents for

**ILLINOIS MFG. CO'S LANTERNS.**

Wire, etc.

**ROEBLING'S****WIRE ROPE**

For Best

IRON or STEEL WIRE HOISTING, RUN-

NING or STANDING ROPES, or BEST

GALVANIZED CHARCOAL WIRE

ROPES FOR SHIP'S RIGGING,

Address, JNO. A. ROEBLING'S SONS, Manufacturers,

Trenton, N. J. or 117 Liberty St., N. Y.

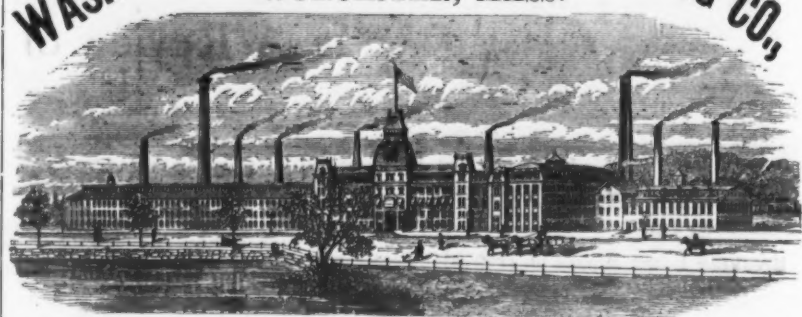
Wheels and Ropes for transmitting power long

distances. Send for Circular and Pamphlet.

**Wire, etc.**PHILIP L. MOEN,  
Pres. & Treas.CHAS. F. WASHBURN,  
Sec'y.**WASHBURN & MOEN MANUFACTURING CO.,**

Established 1831.

WORCESTER, MASS.



MANUFACTURERS OF

**IRON AND STEEL WIRE.**

WIRE RODS of all Grades: Round Iron, Street quality 3-16 in. to 1/2 in., cut to any length. Owners and exclusive Operators of the PATENT CONTINUOUS ROLLING MILL, producing iron and steel wire, in coils of 100 pounds without seam or weld. Patent Galvanized Telegraph Wire, Market and Stone Wire, Annealed Fence and Grape Wire in long lengths; Coppered Rail-Rail Wire; Rope, Bridge, Bolt, Screw, Rivet, Buckle and Chain Wire. Wire for the manufacture of Card Clothing, Heddles, Reeds &c. Piano-string Covering Wire, Tinned Broom Wire and Tinned-plated Wire of all sizes. A specialty is made of Clock, Machinery Covering Wire, Spiral Spring Wire, and Refined Wire to Pattern for particular purposes, from selected stamps of Norway Iron. Any grade of Wire furnished, Annealed, Bright, Polished, Coppered, Galvanized or Tin Plated. Wire furnished, straightened and cut to any length. Steel Crinoline Wire, Patent Linen Finish. Unriveted Steel Music Wire. Steel Wire for Springs, Needles and Drills. Market Steel Wire kept in stock, all sizes.

Warehouse, 42 CLIFF STREET, NEW YORK.

**National Wire and Lantern**

Works.

Warehouse, 45 Fulton Street, New York.

**HOWARD & MORSE,**

MANUFACTURERS OF

BRASS, COPPER AND IRON

**WIRE CLOTH,****Ship and Railroad Lanterns,**

Signal Lights, Conductors' Lanterns,

ADJUSTABLE GLOBE HAND LANTERN,

DESK AND OFFICE RAILING

Riddles, Coal and Sand Screens,

NUMEROUS FENCES &amp; SPARK GUARDS

Ornamental Wire Fence.

Geo. W. Prentiss &amp; Co.,

HOLYOKE, MASS.,

**IRON****WIRE.**

Bright, Coppered, Annealed and Tin

Plated. Also GUN SCREW WIRE

Of all sizes straightened and cut to order.

The Wilmot Mfg. Co.,

96 John Street, Bridgeport, Conn.

50 Barclay Street, New York.

Manufacturers of

**KEROSENE BURNERS and LAMP**

TRIMMINGS, Etc.

We invite your attention to our extensive facilities for

manufacturing articles of utility, novelty, or embellish-

ment, and assure you of our ability to meet the require-

ments of every branch of trade. The increasing demand

upon us has made it necessary to extend our works, and

we now occupy the entire premises, No. 39 John Street,

and our facilities for the production of Light Metallic

Goods, in Copper, Brass or other Sheet Metals, are un-

surpassed. The use of the most approved machinery

and appliances, our long experience and established

reputation in this branch of manufacture, encourage

to solicit still more extended relations with those who

require work of this class, and we take this method of

calling your attention to our establishment.

**A. A. BENEDICT,**

Manufacturers' Agent &amp; Wholesale Dealer in

**KEROSENE BURNERS,****Lanterns, Lamps,**

And Lamp Trimmings of all Descriptions,

Shades, Chimneys, Wicks, &amp;c.

99 Chambers St., cor. Church, N. Y.

Agents for

**ILLINOIS MFG. CO'S LANTERNS.**

Wire, etc.

**ROEBLING'S****WIRE ROPE**

For Best

IRON or STEEL WIRE HOISTING, RUN-

NING or STANDING ROPES, or BEST

GALVANIZED CHARCOAL WIRE

ROPES FOR SHIP'S RIGGING,

Address, JNO. A. ROEBLING'S SONS, Manufacturers,

Trenton, N. J. or 117 Liberty St., N. Y.



# Brass Goods.

**HICKCOX MFG. CO.,**  
280 Pearl St., N. Y., Manufacturers of  
Stamped Brass & Silvered Goods.

PLATED ROSES, PICTURE NAILS,  
TRIMMINGS, DISKS,  
ESCUTCHEONS, BRASS CAPS,  
DROP BASES, LABLES.  
Patent Mirror Business Cards,  
The only indestructible and most attractive card, spe-  
cially made for expositions, fairs, &c.  
Patent Tin Handle Mangle Caps & Brushes.  
Special facilities for manufacturing small articles of  
new style and design to order.

# Brass & Copper SEAMLESS TUBING

For Locomotive, Marine and Stationary Boilers.  
**MERCHANT & CO.,**  
595 Arch & 520 Cherry Sts., Philadelphia.  
**HOOKS SMELTING CO.**  
SUCCESSIONS TO

**H. W. HOOK**  
METALLURGIST.  
SMELTER & BRASS FOUNDER.  
MANUFACTURER OF  
ALL KINDS OF  
BRASS CASTINGS.  
TYPE, STEREOTYPE,  
BABBIT & ANTI-FRICTION  
METALS.  
SOLE IMPORTERS OF  
BLOCK TIN, LEAD,  
ANTIMONY &c.  
BROAD & HAMILTON ST. PHILA.

Railroad and Machinists' Supplies.

**J. D. SHEPARD**  
RIGHT OR LEFT HAND, SURFACE  
GATE HINGE & LATCH.  
NEW SURFACE GATE HINGE & LATCH  
TO SWING BOTH WAYS.  
DOUBLE LOCKING BLIND HINGE.  
"STANDARD" BLIND HINGE.  
ALL EXTRA HEAVY PATTERNS.



**Jno. D. SHEPARD**  
MANUFACTURER  
BUFFALO, N.Y.

THE  
**Gilbert & Bennett Mfg. Co.,**  
GEORGETOWN, CONN.,  
MANUFACTURERS OF

# Iron Wire, Curled Hair AND GLUE.

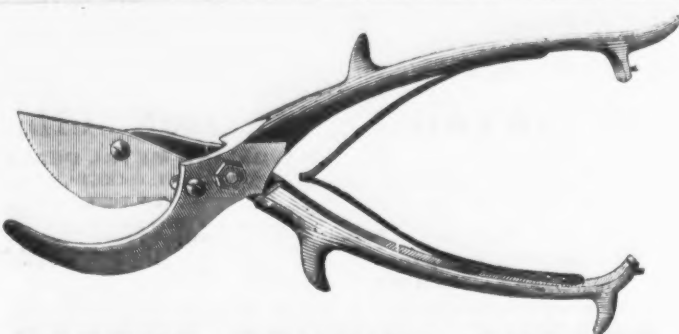
**Gilbert & Bennett Manufacturing Co.**  
Cent. Out and Hair Sieves,  
Hair & Wire Gravy Sieves,  
Brass and Iron Wire Cloth,  
Electric Saws, Serrans,  
Wire Ox Muzzles,  
Stove Cover Litters,  
Cent Holes and Shovels,  
Stove Scrapers and Pickers.

**Gilbert's Rival Ash Sieve.**  
**UNION METALLIC CLOTHES LINE**  
**WIRE.**

The highest price paid for Cattle's Tails and Hog's Hair  
**WAREHOUSE,**  
273 Pearl Street, New York.

**CLARK & CO.'S**  
PATENT  
Self-Coiling, Revolving  
**STEEL SHUTTERS**  
FOR  
Store Fronts & Rear Windows.  
FIRE AND BURGLAR PROOF  
Also, SELF-COILING  
**Wood Shutters**

In various kinds of wood, suitable for Store Fronts,  
Private Houses, Offices, and School Partitions.  
**The Best & Cheapest Shut-  
ters in the World.**  
All Real Estate owners are invited to inspect them  
at the factory,  
218 West 86th Street, New York.  
**JAS. G. WILSON, Manager.**  
Chicago Office, 64 La Salle Street.



# PATENT PRUNING SHEARS.

No. 1 Swivel Blade, No. 2 Stationary Blade, manufactured by

# TRENTON VISE AND TOOL WORKS,

TRENTON, N. J., Manufacturers of  
Solid Box Vises, Hammers, Sledges, Picks, Mattocks, Grub Hoes, etc.  
Warehouse, 101 & 103 Duane St., N. Y., **HELMANN BOKER & CO.**  
Our Vises are warranted to do more work than any other make. No broken boxes or screws.

# "THE CHICAGO" TEA KETTLE.

We herewith illustrate the only really good TEA KETTLE now made. We furnish only the Trimmings for them; and show cuts of the Handle and Spout. The former article is much stronger than any handle which has ever been introduced. It fits the kettle splendidly, and being hollow, NEVER HEATS. The ear is strong and has a wide base. Altogether it is a fine thing, and sells at sight.  
Price Plain, 75 cts. per doz.; Re-tinned, \$1 00.  
The Spout, it will be noticed, is stamped from one piece of 1 x 1 in. and side flanges folded ready to lock into the body of the kettle; it is then double seamed to the bottom, as the rest of the body is. It never leaks, as do all other spouts, and cannot clog with lime. We have sold immense quantities of them, and the sale grows constantly.

Re-tinned, per doz.—5 in. (No. 30), 67 cts.; 6 in. (No. 60), 75 cts.; 8 in. (No. 70), 80 cts.  
All are 2 1/2 in. wide.  
If you make all of your Tea Kettles with the CHICAGO TRIMMINGS, you will materially increase your trade.

**F. STURGES & CO.,**  
Proprietors of the  
**CHICAGO STAMPING WORKS,**  
Office and Salesrooms, 72, 74 and 76 LAKE STREET, CHICAGO, ILL.

# P. R. ERLING & CO.,

122 West Water Street, MILWAUKEE, WIS.  
Manufacturers' Agents and Jobbers of

# HARDWARE, TIN WARE, RAILROAD SUPPLIES

And SPECIALTIES in the  
IRON AND HOUSE-FURNISHING GOODS LINE. Open Feb. 1, 1876.

**AMERICAN INSTITUTE**  
NEW YORK  
**Cherry Heat-Welding**  
TRADE MARK  
ESTD. 1874  
**COMPOUND**  
AWARDED NOV. 21, 1874.

This Compound is manufactured under the inventor's personal supervision, and is put up and warranted genuine only in 1, 5, 10, 50 and 100 lb. packages, and under the above trade mark. The 1, 5 and 10 lb. packages are kept for sale by the following, among other houses, who will also procure, on order, the larger ones:

- |   |  |
|---|--|
| C. VAN HORN & Co., New York City.           | WYETH & BRO., Baltimore, Md.                 |
| BOUTON & SMITH, " "                         | SEWARD, NORRIS & Co., Baltimore, Md.         |
| JOHN P. JUNE & Co., " "                     | W. H. & G. W. ALLEN, Philadelphia, Pa.       |
| GIFFORD & BEACH, " "                        | GARRETT FINLEY & Co., Wilmington, Del.       |
| MAURICE E. VIELLE, Albany, N. Y.            | A. BITTENBENDER & Co., Scranton, Pa.         |
| WINNE, BURDICK & Co., Troy, N. Y.           | WILCOX BROTHERS, Toledo, Ohio.               |
| EVERSON, FRISSELL & Co., Syracuse, N. Y.    | ROHM & DAVIDSON, Detroit, Mich.              |
| S. B. ROBY & Co., Rochester, N. Y.          | BOUTON, SMITH & WANDELL, St. Louis, Mo.      |
| PRATT & Co., Buffalo, N. Y.                 | NICOLS & DEAN, St. Paul, Minn.               |
| BARKER, DOUNCE, ROSE & Co., Elmira, N. Y.   | GEORGE FRITZ, Denver, Colorado.              |
| HUGHES & HUTCHINSON, Trenton, N. J.         | JAMES MCGRAW, Richmond, Va.                  |
| CONGDON, CARPENTER & Co., Providence, R. I. | W. W. WOODRUFF & Co., Knoxville, Tenn.       |
| F. A. & A. M. SMALL & Co., Boston, Mass.    | VANCE & KIRBY, Chattanooga, Tenn.            |
| BLODGETT & CLAPP, Hartford, Conn.           | MIDDLETON BROS. & Co., Atlanta, Ga.          |
| C. S. MERICK & Co., New Haven, Conn.        | JOSEPH LABADIE, Galveston, Texas.            |
| FRED. A. TAFT, Bridgeport, Conn.            | H. R. IVES & Co., Montreal, Prov. of Quebec. |
| PARKHURST & WILKINSON, Chicago, Ills.       | JOHN G. WILKINSON & Co., Newburgh, N. Y.     |

Any further information desired can be had by addressing  
**SCHIERLOH MANUFACTURING COMPANY,**  
24 Exchange Place, Jersey City, N. J.

# O. LINDEMANN & CO.,

Manufacturers of  
JAPANESE AND PATENT BRIGHT METAL

# Bird Cages.

Received the  
**FIRST MEDAL**  
at the  
World's Exposition of Vienna,  
1873

Office and Salesrooms,  
No. 254 Pearl Street  
Factory,  
Nos. 252, 254 & 256 Pearl Street,  
NEW YORK.



# BUCK BROTHERS, Millbury, Mass.

# PLANE IRONS.

The most complete assortment in the U. S. of Shank, Socket Firmer, and Socket Framing Chisels.  
Gouges of all lengths, and circles beveled inside or outside. Nail Sets, Scratch and Belt Awns, Chisel Handles of all kinds. Orders filled promptly; generally same day as received.

# The Stove Trade and Its Evils.

We have the following letter from a pattern maker, discussing some aspects of the stove trade, which will be read with interest:

PHILADELPHIA, Feb. 21st, 1876.

To the Editor of The Metal Worker.—DEAR SIR: Please allow me a word in regard to the evils of the stove trade, and what I think is one of the remedies. In your paper of the 12th inst. are two letters, one from "Drummer," the other from Base Burner. Drummer asks who is to blame for the evils? He answers: 1st, the manufacturers for countenancing and making the "novelties," which are claimed to be worthless and expensive; and 2d, the dealers, because they seek the novelties only. "Base Burner" says he changed his patterns only so much and so often as was necessary to keep them up to what he considered the highest excellence; yet was compelled (reluctantly), in order to compete with those manufacturers who were making novelties, and to sell his goods, to so alter and get up new patterns, that he is now in a whirlpool, and by stopping the novelties nothing but ruin stares him, and to go on is dangerous. What a state of affairs! Mr. Editor, the truth is that just such manufacturers as "Base Burner" have been the cause of this rush after novelties. It is not the manufacturers or the dealers who cry for novelties, but the public. No sane man would put articles before the public if there was no demand for them, and it is through the enterprise of a few leading spirits, who, knowing the wants of the trade, feel it is high time the manufacturers of stoves should make an attempt to have their goods in keeping with the progress of the nineteenth century; goods that would be in keeping with the progress made in the manufacture of furniture, tapestry, carpets, &c., &c.; something in keeping with the furnishing of a room; a "full jeweled," frilled, artistic piece of bright furniture, and not as "Base Burner" would probably have, something of an ugly, black, dirty looking old-fashioned thing, out of place in a room, but something bright and cheerful. This, Sir, has been the cause of the rush after novelties. Is it not conceded by every stove manufacturer that, even in these dull times, they have done a larger business than for many years back, showing conclusively that the public appreciate the novelties which are termed worthless, frilled and full jeweled? Is it not the case that those manufacturers who have and are getting up the frilled and full jeweled novelties, are doing the largest trade? Is it not high time that an effort was made to make our stoves so that we would care to have them in our parlors, bright and cheerful, radiating a pleasant warmth, while giving cheerfulness over the room, controlled by just such contrivances as dampers, checks, &c., as men like "Drummer" pronounce to be things to talk about. Let us hear no more about the cry to stop the novelties, because some manufacturers have not the grit, or the brains, to know what the public of this centennial year require. Now, Sir, I shall say a word as to the remedy of the evils of the stove trade. 1st. It is not by stopping the novelties, for I believe that after what will be seen at the great fair in our city, there will be a greater demand for novelties than ever before. But the remedy lies with the manufacturer, who, by stopping the system of buying iron duplicate patterns, would go far toward making a more healthy and legitimate paying business. How, I ask, is it possible that a manufacturer can compete and sell his goods in fair competition when, after getting up his wood patterns, each size costing from three to eight hundred dollars, he finds his neighbor has an equally good thing which he has bought in iron duplicate from sixty to one hundred and fifty dollars per size? If every manufacturer was getting up his patterns in wood there would be fair competition just as in other businesses, but how easy to unceremoniously get up a duplicate cost but a fifth of the cost of the wood patterns. By manufacturers abstaining from buying iron duplicates those small foundries would, for want of the capital, be compelled to run only a few specialties, and do a more healthy business, and the larger houses would get up a more full line of goods; there would be a fair competition all round, and at same time that while less iron novelties (duplicates) were put on the market, more legitimate, standard, practical novelties would be required. Every manufacturer would, more or less, have a style of his own, and then a fair competition for the best talent to get them up. As it is now, much of the business of getting up those novelties is centered in the iron duplicate pattern establishments, who the one season get up patterns with the view of beating them the next season, thereby causing an unhealthy antagonism in the trade. I say stop the duplicate business, and your trade, by getting up every season a fair show of work in wood patterns, will be as healthy and remunerative as other businesses, and as your business was previous to the demand for duplicate patterns. Trusting to find a space for these somewhat crude remarks in your valuable paper,  
I am, truly yours,  
PATTERN MAKER.

# SOMETHING PERTAINING TO "FRILLS."

A gentleman well known in the stove trade, and a member of one of our largest manufacturing firms, sends us the following, which, as a contribution to the humorous literature of this discussion, will afford much amusement:  
This is how it was. The circulars came home containing a full and glowing description of the "Auffully Clever," with its high-low-jack reservoir, patent pull down the blind drafts, nickel feet, etc. The stove itself, drawn in all sorts of positions to catch the eye. The traveler's sack was packed with these, and his head was loaded with the gush necessary to push the "Auffully Clever" from Dan to Bebeba. He toured the country; how well he succeeded is plain to be seen by the bowl now going up about "frills."  
This is what happened in Grundyville: When the tourist, gusher, or whatever they call him, arrived, he waltzed around the trade until he found his man, and he fixed him. The dealer formerly sold quite a quantity of the "Dodos" made by the "Clever" folks, and had intended to give a good order to the musician when he came. But "frills" done it, and he was induced to lay himself out on them. They arrived in due season and where given a high place in the store, and all his customers, from the small boy upward, were filled with its merits.  
Mrs. Hopkins Twiddy got the first one. She came to purchase a "Dodo," but the pull down the blind attachment, etc., was so dilated upon that she couldn't resist, although not until she had run the town over to see if one could be purchased elsewhere. It was put up, Twiddy didn't like it, "Dodo" was good enough for him. The neighbors were invited in and made envious at the sight of the new stove with all its "frills." The Widow Jones expressed her dislike to all such new fangled jinn-cracks, and said her "Old Times Rocker" that she had had for high on 20 years, would beat it all to pieces, but she was only jealous of the Twiddy's stove.  
Mrs. T. never had very good luck with it, but she was on her mettle with T., and she backed the "Clever" up against anything in the world, and never tired of pulling down the blind for visitors. The "Auffully Clevers" soon got

noised about, and the other Grundyville dealers were constantly informed by their patrons that they should have such a stove; down the street they were selling like hot cakes, and if they had one would buy from them, of course. The other dealers commenced to look about for something like it, and any "Gorilla" that had a resemblance to an A. C. soon found a customer. The professional who didn't have anything "Clever" argued and chined with his customer against them, but it was no go; he gets disgusted—writes home: "No use of us trying to sell goods, must have something 'Auffully Clever,' could have sold 1000 of them so far on this trip" (been out 3 days). These reports reach home, and immediately all the loss of trade, etc., is attributed to the absence of something "Clever," and preparations are made for a grand raid as soon as possible on the "Auffully Clever."

The next season sees the market loaded with "frills." The "Rock me to sleep Mother," with nickel flue plates, mica top oven plate, etc. "Mother I've come home to Die," with a reversible reservoir and late improvements. The "Kiss me Mother," with illuminated bottom and tops, etc. Then come the circus bills and show cards, with all sorts of groupings—fat and lean ladies and servants with diabolical looking legs and feet, peculiar looking old parties rapt in admiration at the wonderful stove. One chap is holding his watch, looking very inquiringly at the stove as though it was the slowest baker he ever seen. Another has his stove so hot that he cannot approach it, possibly from the magazine igniting, and there was lots of other interior views that would have astonished the old Dutch painters. Then came the row as to who was the original owner of all these patent "frills" and devices. The maker of the "Stand me on my head, Mother," claims that his coal scuttle attachment was made before any "Mother" was thought of. The "Rock me to sleep" men says the first "Mother" was made in their shop, and so it goes. Then the law is invoked, and a law department is in order for each concern, and from the present aspect the Lawyer's Co-operative institution will run the stove business of the future. Then lawyer chaps can cord up a stove so that a man would think he owned a 100 horse engine patent, by the looks of the paper description. They will get control, sure pop, if it is kept up much longer.

New claims are constantly turning up. One maker claims the space between the coal scuttle and outside of the house, but does not broadly claim the coal in the scuttle. Another claims a scuttle of coal and stove, in combination with the family cat. Still another claims the annular space surrounding a stove; in fact, the proverbial Philadelphia legal luminary has suicided after looking over these claims. I learn from an undoubted source that the stove Mrs. Noah used in the damp season, several centennials ago, was an "Ash Burner," while another says he can bring proof that the old lady used a charcoal furnace on deck, and that Ham, when he took in the bow line, chucked it against the furnace and knocked it over the hatchway and it fell on the camels back, and the hot coals caused it to bump! The world is being ransacked for supporting evidence on many of these claims. Stanley is looking for reservoirs in the Africans country, particularly after the Nile patent, which he thinks will bust all the rest, and the next Arctic expedition is to contain an expert to examine the Pole regions for ascending and descending lines, and will have a ladder expressly for climbing up the axle stick.

As the Dutchman says: "Whose the reasons of this." It must have been Mrs. Twiddy—the manufacturers had nothing to do with this row. If the imitators and improvers of the "Auffully Clever" had let it alone, perhaps "Old Times Rocks" would have held out yet, and circus shows, law examiners and explorers would never have crept into our once happy family. Even the traveling dispenser of "chin music" might have been on the quiet gentel, instead of the swaggering swell that he now is.

But, in spite of all this rumour, "frills" have got a start, and those that are really "clever" will take; anything short of that will fail. Time will tell who is on the right tack. If A. chooses to make his "Dear Mother" with nickel feet and ground edges, he needn't travel if he gets stuck; the trouble might not be so much with his "dear mother" as with himself. I don't deal in or make stoves, I only polishes them, and, perhaps, I may be wrong.  
JEEMS, THE BLACKER.

NEW YORK, February, 1876.

# Construction of Lightning Protectors.

Whether the point of a lightning conductor is made of platinum or of copper, or whether it is sharp pointed, as suggested by Franklin, or presents an angle of 30° in accordance with the latest notions, however great may be the care taken in welding the metals, it is certain that in this respect the mode of construction is defective as regards conductivity, and it is to be feared that the conductivity is diminished by the action of the weather. But it appears further to be demonstrated that it is at the joint that a lightning protector is most often destroyed; it is there the discharge takes place.

At first, Franklin proposed that the conductor should be made of one metal only. It is owing to the rapid oxidation of iron that the successive commissions have proposed to modify the nature of the extremity of the conductor. We think that it is possible to return to the original idea, since it is known how to cover iron with a metal (nickel), which forms on its surface a film perfectly protecting it from oxidation, and possessing the necessary conductivity.

We have experimented with the conductivity of nickel spread over a rod of iron. The nickelized surface indicated a rather higher conductivity than the mass of iron; it resisted better the electric discharges given off by a powerful battery. The same rod, after being immersed in water for 10 days, did not indicate any alteration, and the electric conductivity remained the same.

We think, then, that in the future construction of lightning protectors, it would be expedient to do away with the copper or platinum tips, the termination being made of a single piece of nickelized iron, in the same way as the conducting rod is made.

The lightning protector would thus become a safeguard against electric discharges, and, owing to the preservation of its point, would always possess the same protective effect. Again, the conductivity would remain constant, and the necessity of supervision be done away with. This last condition is of great importance, as illustrated by General Morrin. According to him, it is desirable that you should be able to verify automatically the condition of the lightning protector as regards conductivity. In fact, every one knows that, if the conductivity is defective, the lightning protector becomes a source of danger.—E. Saint Edme.



Iron.	Iron.	Iron.	Iron.	Iron.
<p><b>NEW YORK.</b></p> <p><b>OGDEN &amp; WALLACE,</b> Successors to GAM'L G. SMITH &amp; CO., <b>IRON WAREHOUSE,</b> 85, 87, 89 and 91 Elm Street, New York. (One block below Canal Street.) <b>COMMON AND REFINED IRON</b> <b>SHEET AND PLATE IRON,</b> Red, Hoop, Band, Scroll, Horse Shoe, <b>Angle and T Iron.</b> <b>PIG IRON, OLD RAILS,</b> Wrought Iron Beams. Iron of all sizes and shapes made to order.</p> <p><b>PIERSON &amp; CO.,</b> Established 1790, 22 &amp; 26 Broadway, 77 &amp; 79 New St. <b>NEW YORK CITY</b> AGENTS</p> <p><b>Burden's Best Iron</b> And Burden's H. B. &amp; S. Iron. All sizes and shapes in stock.</p> <p><b>JACKSON &amp; CHACE,</b> 306 &amp; 208 Franklin St., N. Y. Importers and Dealers in</p> <p><b>IRON and STEEL.</b> Agents for JOHN A. GRISWOLD &amp; CO'S Bessemer Steel, MACHINERY STEEL, Cast Steel and SPRING STEEL, ANGLE and T IRON. Special Irons for Bridge and Architectural Work.</p> <p><b>ABEEL BROTHERS,</b> Established 1765 by ABEEL &amp; STANCK, <b>Iron Merchants,</b> 190 South Street and 365 Water, N. Y.</p> <p><b>ULSTER IRON</b> A full assortment of all sizes constantly on hand. Refined Iron, Horse-Shoe Iron, Common Iron, Band, Hoop and Scroll Iron. Sheet Iron. Norway Nail Rods. Norway Shapes. Cast, Spring and Tire Steel, etc.</p> <p>A. R. WHITNEY. J. HENRY WHITNEY. <b>A. R. Whitney &amp; Bro.,</b> Manufacturers of and Dealers in</p> <p><b>IRON,</b> 56, 58 &amp; 60 Hudson, 45, 50 &amp; 52 Thomas, and 13, 14 &amp; 16 Worth Sts., Our specialty is in</p> <p><b>Manufacturing Iron</b> Used in the Construction of <b>Fire-Proof Buildings, Bridges, &amp;c.</b> AGENCY OF Abbott Iron Co. Boiler Plate &amp; Tank Iron. Ginsow Tube Works Boiler Flues. Pascucci Iron Works Shuttling. Pascucci Rolling Mill Angles and Tees. A. E. Whitney &amp; Bro.'s Rills. Whitney's Best Bar Iron. Pascucci Rolling Mill Wrought Iron Beams and Channel Iron. Pascucci Rolling Mills. Books containing Cuts of all iron now made, and Sam- ple Pieces at office. Please address 55 Hudson Street.</p> <p><b>METAL ROOFING.</b> <b>Hickcox Mfg. Co.,</b> 240 Pearl Street, N. Y., Manufacture the Patent Corrugated Iron Shing- les, making the most durable roof in the market, not affected by contraction or expansion, which causes sud- den the roofs to leak. Price only \$7.50 per square, painted on both sides, packed ready for shipping.</p> <p><b>BORDEN &amp; LOVELL,</b> <b>Commission Merchants</b> 70 &amp; 71 West St., New York. Agents for the sale of Fall River Iron Co.'s Nails, Bands, Hoops &amp; Rods, AND Borden Mining Company's Cumberland Coals.</p> <p><b>WILLIAM H. WALLACE &amp; CO.,</b> <b>IRON MERCHANTS</b> Cor. Albany &amp; Washington Sts., NEW YORK CITY. WM. H. WALLACE. WM. BISPHAM</p>	<p><b>NEW YORK.</b></p> <p><b>G. HUERSTEL,</b> <b>IRON AND STEEL.</b> Warehouse, 99 Market Slip, N. Y. <b>IRON AND STEEL OF ALL KINDS</b> Constantly on hand. Horse Shoe Iron and Nails, Nor- way Iron, Cast Spring, Toe Calk, and Bessemer Steel Tire. Also, <b>SPRINGS, AXLES AND BOLTS,</b> For Truck and Carriage Makers.</p> <p><b>WM. GARDNER'S SONS,</b> Successors to WM. GARDNER, 875 Grand, 414 Madison &amp; 309 Monroe Sts. <b>Bar, Hoop, Rod, Band and</b> <b>A. W. Horse Shoe Iron.</b> <b>NORWAY NAIL RODS AND SHAPES.</b> Spring, Toe Calk, Tire &amp; Sleigh Shoe Steel. Manufacturers and Proprietors of <b>PATENT BOLT HEADER.</b></p> <p><b>A. B. Warner &amp; Son,</b> <b>IRON MERCHANTS,</b> 28 &amp; 29 West and 52 Washington Sts. <b>BOILER PLATE,</b> Boiler Tubes, Angle, Tee &amp; Girder Iron, Heller and Tank Rivets. Sole Agents for the celebrated "Eureka," Pennocks, "Wawasset," Lukens, Brands of Iron. Also all descriptions of Plate, Sheet, and Ureometer Iron. Special attention to Locomotive Iron. Fire Box Iron a specialty.</p> <p><b>Geo. A. Boynton</b> <b>BROKER IN IRON</b> 70 WALL ST., N. Y.</p> <p><b>POWERVILLE</b> <b>ROLLING MILL,</b> JOHN LEONARD, 450 &amp; 451 West Street, NEW YORK. Manufacturer of Best Quality <b>HORSE SHOE IRON,</b> And <b>HOOPS.</b> Also Best Quality Cold Blast Charcoal Scrap Blooms, And Dealer in <b>OLD IRON.</b></p> <p><b>Marshall Lefferts, Jr.,</b> 80 Beekman St., New York, MANUFACTURER OF <b>AMERICAN</b> <b>Galvanized Sheet Iron,</b> AND AGENT FOR THE Easton Sheet Iron Works, Easton Pa. MANUFACTURER OF Best Bloom, Charcoal &amp; Refined Sheet Iron. Galvanized Telegraph and Fence Wire Galvanized and Tinned Roofing and Slatings Nails. Galvanized Hoop Iron of all widths. Galvanized Staples. Corrugated Iron for Roofing, plain or gal'd. Galvanized Bars and Chains for Cemetery Railing. Tin Plates, Spelter, and other Metals.</p> <p><b>DANIEL F. COONEY,</b> (Late of and Successor to Jas. H. Holdane &amp; Co.) 87 Washington St., N. Y. <b>BOILER PLATES and SHEET IRON,</b> LAP WELDED BOILER FLUES. Boiler Rivets, Angle &amp; T Iron, Cut Nails &amp; Spikes. Agency for Pottstown Iron Co. Viaduct Iron Works, Lebanon Rolling Mills, Fine Iron Works, Laurel Iron Works, The Bergen Rolling Mills, at Jersey City.</p> <p><b>J. C. LEFFERTS,</b> <b>Metal Broker,</b> <b>PIG, RAILROAD &amp; SCRAP IRON.</b> 241 PEARL STREET, NEW YORK.</p> <p><b>Bonnell, Botsford &amp; Co.,</b> <b>Iron, Nails &amp; Spikes.</b> YOUNGSTOWN, OHIO.</p> <p><b>W. MINOR SMITH,</b> <b>BROKER IN</b> <b>Pig Iron &amp; Metals.</b> 95 BEAVER STREET, NEW YORK.</p>	<p><b>NEW YORK.</b></p> <p><b>T. D. HAZARD,</b> <b>BROKER IN</b> <b>NEW &amp; OLD RAILS,</b> Foreign and Domestic <b>PIG IRON,</b> Wrought and Cast Scrap Iron AND GENERAL METALS. 204 Pearl St., New York.</p> <p><b>JAMES WILLIAMSON &amp; CO.,</b> SCOTCH AND AMERICAN <b>PIG IRON,</b> No. 69 Wall St., New York.</p> <p><b>U. O. CRANE.</b> <b>BROKER IN</b> <b>PIG IRON &amp; METALS,</b> 104 John St. New York.</p> <p><b>John W. Quincy,</b> 95 William Street, New York. Anthracite &amp; Charcoal Pig Irons, <b>CUT NAILS, COPPER,</b> BLOCK TIN LEAD, SPELTER, ANTIMONY, NICKEL, &amp;c</p> <p><b>BOONTON</b> <b>CUT NAILS,</b> <b>HOT PRESSED NUTS,</b> Machine Forged Bolts, Washers. <b>Fuller, Lord &amp; Co.,</b> <b>BOONTON IRON WORKS,</b> 139 Greenwich Street, New York.</p> <p><b>Swedish Iron.</b> A Variety of Brands, including IB HP NB 03 BARS suitable for Steel of all grades. Wire, Shovels, Hoes, Scythes, Carriage Bolts, Nail Irons, Tacks, &amp;c. <b>CHARCOAL PIG IRON</b> for Bessemer and Cast Iron. MUCK BARS for Steel Smelting and Re-rolling. SCRAP or BAR ENDS. Direct Agency for N. M. HÖGLUND, of Stockholm, represented in the United States by <b>NILS MITANDER,</b> 69 William St., New York. JERE ABBOTT, AGENTS: ALBERT POTTS, Boston, Mass. Philadelphia, Pa.</p> <p><b>Dan'l W. Richards &amp; Co.,</b> Importers of and Dealers in <b>SCRAP IRON,</b> <b>Pig Iron,</b> <b>OLD METALS.</b> 88 to 104 Mangin Street, Foot of Stanton St., E. R., NEW YORK.</p> <p><b>B. F. JUDSON,</b> Importer of and Dealer in SCOTCH AND AMERICAN <b>Pig Iron,</b> Wrought &amp; Cast Scrap Iron, English and American <b>HORSE SHOE IRON, &amp;c.,</b> 437 &amp; 439 Water St., NEW YORK, and 235 South St.,</p> <p><b>GRATE</b> <b>BAR</b> "ECONOMY." GEO. VANDERBILT, Sole Agent. Especially adapted for burning Pea Coal, Lignite and Dust, and other fine material. Office, Foot West 19th Street, New York.</p> <p><b>PETER P. PARROTT,</b> Manufacturer of the "CLOVE" <b>ANTHRACITE PIG</b> <b>IRON.</b> At Greenwood Iron Works, ORANGE CO., N. Y.</p>	<p><b>NEW YORK.</b></p> <p><b>HARRISON &amp; GILLOON</b> <b>IRON AND METAL DEALERS,</b> 508, 560, 562 WATER ST., and 302, 304, 306 CHERRY ST., NEW YORK. have on hand, and offer for sale, the following: Scotch and American Pig Iron, Wrought, Cast and Machinery Scrap Iron, Car-Wheels, Axles and Heavy Wrought Iron, also old Copper, Composition, Brass, Lead, Pewter, Zinc, &amp;c.</p> <p><b>OXFORD IRON CO.,</b> <b>Cut Nails and Spikes,</b> R. R. Spikes, Splice Bars and Nuts and Bolts, 81, 83 &amp; 85 Washington, near Rector St., N. Y. <b>JAMES S. SCRANTON, Agent.</b></p> <p><b>BRADLEY, REIS &amp; CO.,</b> NEW CASTLE, PA., Manufacturers of every description of <b>PLATE &amp; SHEET IRON</b> Office, 29 Cliff Street, N. Y.</p> <p><b>ESTABLISHED 1840.</b> <b>PETER TIMMES' SON,</b> Manufacturer and Galvanizer of Wrought, Ship, Boat, Dock &amp; R. R. <b>SPIKES, RIVETS, NAILS, &amp;c.</b> Nos. 281, 283 &amp; 285 N. 6th St., Near junction of N. 3d St., Brooklyn, E. D.</p> <p><b>BURDEN'S</b> <b>HORSE SHOES.</b> "Burden Best" Iron <b>Boiler Rivets.</b> Burden Iron Works, H. Burden &amp; Sons Troy, N. Y.</p> <p><b>Pottsville Spike, Bolt and</b> <b>Nut Works.</b> G. D. ROSEBERRY, Pottsville, Pa. Manufacturer of <b>RAILROAD SPIKES,</b> <b>MINING SPIKES,</b> Cold Pressed Nuts, Machine Bolts &amp; Bolt Ends <b>ELY &amp; CO.,</b> <b>Hot Pressed Nuts, Bolts,</b> Bolt Ends, Rivets, Lag Screws, Washers, etc. Hoop, Bar, Band and Horse-Shoe Iron. 113 Chambers Street, New York.</p> <p><b>Spooner &amp; Collins,</b> COMMISSION AGENTS, <b>PIG IRON</b> Blooms, Bar, Sheet &amp; Hoop Iron. 409 N. Third St., (Room No. 6), St. Louis.</p> <p><b>COLEMAN &amp; BRO.,</b> Manufacturers' Agents and Brokers <b>PIG IRON, NAILS, RAILS, NUTS,</b> And General Railroad Supplies. LOUISVILLE, KY.</p> <p><b>J. O. CARPENTER,</b> Commission Merchant, Common and Refined Bar and Nut Iron, <b>HOT PRESSED NUTS.</b> Machinery and Railroad Supplies, Carriage Machine Bolts and Washers. (Room 14.) 104 JOHN STREET, N. Y.</p> <p><b>Phoenix Brass &amp; Iron Foundry</b> EDWARD GOUGH, Allentown, Pa., Manufacturer of <b>Soft &amp; Hard Chill Rolls, Sand Rolls &amp; Pinions.</b> Hard Chill Rolls are guaranteed to be uniform and made to any depth of chill, to suit. The only manufacturers of Soft Chill Rolls in the United States.</p>	<p><b>PITTSBURGH.</b></p> <p><b>PENNSYLVANIA IRON WORKS.</b> <b>EVERSON, MACRUM &amp; CO.</b> Pittsburgh, Pa., Manufacturers of every description of <b>Bar, Sheet and Small Iron,</b> Make a specialty in <b>Fine and Common Sheet Iron.</b></p> <p><b>W. P. TOWNSEND &amp; CO.,</b> Manufacturers of <b>WIRE and</b> <b>Black and Tinned Rivets</b> OF CHOICEST CHANCEL IRON. Rivets any diameter up to 7-16 inch and ANY LENGTH required. 19 &amp; 21 Market St., PITTSBURGH PA.</p> <p><b>A. G. HATRY,</b> Manufacturers' Agent and Broker. Bar, Sheet, Tank, Hoiler, Angle, T, and Railroad Iron, Nails &amp; Spikes, Steel &amp; R. R. Supplies. PITTSBURGH, PA.</p> <p><b>SHOENBERGER &amp; CO.</b> Manufacturers of <b>CUT NAILS,</b> AND <b>Spikes,</b> <b>HORSE AND MULE</b> <b>SHOES,</b> Horse Shoe Bar, &amp; <b>SHEET IRON.</b> Goods warranted equal to any in the Market. Send for Circulars in regard to "PICKED NAILS." PITTSBURGH, PA.</p> <p><b>Boston Rolling Mills</b> Manufacture extra quality small Rods, from best se- lected Scrap Iron. <b>SWEDISH AND NORWAY SHAPES,</b> Nail and Wire Rods. Also, <b>HORSE SHOE IRON and HAND</b> <b>MADE HORSE SHOES.</b> BOSTON ROLLING MILLS, W. R. ELLIS, Treas. Office, 17 Battery March St., Boston. Messrs. N. S. Arnold &amp; Co., 312 California St., San Francisco. Sole Agents for the Pacific Coast.</p> <p>"PEMBROKE" Round, Square &amp; Flat Iron. "FRANCONIA" Shafting &amp; Bar Iron. Extra quality when great strain or superior finish is required. Also, Irons for ordinary work, like the "ENGLISH REFINED." <b>WM. E. COFFIN &amp; CO.,</b> No. 8 Oliver Street, Boston.</p> <p><b>ASA SNYDER,</b> Importer of Scotch, and Furnace Agent for the cele- brated Anthracite and Hot and Cold Blast Charcoal <b>PIG IRONS.</b> OFFICE AND YARD: 1008, 1010, 1012 and 1014 Cary Street, Richmond, Va. Orders for Scrap Iron filled.</p> <p><b>J. P. WALSH,</b> Celebrated XX Mineral Facings P. O. Box 4336. 121 Chambers Street. NEW YORK.</p> <p><b>P. W. GALLAUDET.</b> Banker and Note Broker, Nos. 3 and 5 Wall Street, NEW YORK. HARDWARE, METAL, IRON, RUBBER, SHOE, PAPER AND PAPER-HANGINGS, LUMBER, COAL, AND RAILROAD PAPER WANTED. ADVANCES MADE ON BUSINESS PAPER AND OTHER SECURITIES</p> <p><b>CUTLER &amp; BROWN,</b> Shippers and Dealers in all grades of <b>MOULDING SAND.</b> FIRE SAND, FINE CLAY &amp; KAOLIN. Also, manufacturers and dealers in <b>FOUNDRY FACINGS and SUPPLIES.</b> Office, 325 Cherry Street, N. Y. Sand Banks at Albany: Retail Yard, 68 Cherry Street; Factory, 218 &amp; 219 Cherry Street. GEORGE W. CUTLER. CLARENCE J. BROWN.</p> <p><b>IRON</b> <b>RAILINGS.</b> D. Vreeland, Plain and Ornamental Iron Works Railings, Doors, Shutters, Gratings, Stoop Gates, Window Guards, and Builders' Iron Work in general. 138 W. 35th St., near Broadway, New York.</p>



## Iron.

PHILADELPHIA.

## Iron and Steel T and Street Rails

Of Best American and English Makes.  
CHAIRS, SPIKES, FISH BARS,  
RAILROAD SUPPLIES.

Muck Bars, OLD RAILS, Scrap,  
BLOOMS.

American and Scotch  
PIG IRON, AND METALS.  
CHAS. W. MATTHEWS,

133 Walnut St., Phila.

[Late RALSTON &amp; MATTHEWS, 133 Walnut St.]

MALIN BROS.,  
IRON

Commission Merchants,

No. 228 Dock Street,  
3d door below Walnut, PHILADELPHIA.

H. L. GREGG & CO.,  
Ship Brokers & Commission Merchants,

Importers of  
Old Iron, Metals and Rags.

Freight engagements made to all parts of the world.  
Marine insurance effected in reliable offices.

108 Walnut St., Phila.

JUSTICE COX, Jr. & CO.,  
Iron Commission Merchants.

Foundry and Forge Pig Iron,  
New and Old Rails, Muck  
Bar, Scrap, &c.

No. 333 Walnut Street, PHILADELPHIA.

THE CAMBRIA IRON  
WORKS,

Situated on the line of the Pennsylvania Rail Road,  
at the western base of the Alleghany Mountains, are  
the largest of their class in the United States, and  
are now prepared to make

1800 TONS PER WEEK,

Of Iron and Steel Railway Bars.

The Company possesses inexhaustible mines of  
Coal and Ore, of suitable varieties for the produc-  
tion of Iron and Steel Rails of

## BEST QUALITY.

Their location, coupled with every known im-  
provement in machinery and process of manufacture  
enable them to offer Rails, when quality is con-  
sidered, at lowest market rates.

The long experience of the present Managers,  
of the Company, and the available reputation  
they have established for "CAMBRIA RAILS,"  
are deemed a sufficient guarantee that purchasers can,  
at all times depend upon receiving rails unsurpassed  
for strength and wear by any others of American or  
foreign make. Any of the usual patterns of rails  
can be supplied on short notice, and new patterns of  
desirable weight or design will be made to order  
Address,

## CAMBRIA IRON COMPANY,

218 S. 4th St., PHILADELPHIA.  
or at the works, JOHNSTOWN, PA.

## The Phoenix Iron Co.,

410 Walnut St., Philadelphia.

MANUFACTURERS OF

CURVED, STRAIGHT AND HIPPED  
Wrought Iron Roof Trusses

BEAMS, GIRDERS, AND JOISTS,  
and all kinds of Iron Framing used in the construction  
of Iron Roof Buildings.

Deck Beams, Channel Angle  
and T Bars

curved to template, largely used in the construction  
of Iron Vessels.

Pat. Wrought Iron Columns, Weldless  
Eye Bars,

for Top and Bottom Chords of Bridges.

Railroad Iron, Street Rails, Rail Joints and  
Wrought Iron Chairs.

Refined Bar, Shafting, and every variety of  
Shape Iron made to order.

Plans and Specifications furnished Ad-  
dress

SAMUEL J. REEVES Vice Pres

The LACKAWANNA IRON & COAL CO.,  
SCRANTON, PA.,

(OFFICE IN NEW YORK CITY, 52 WALL STREET.)

MANUFACTURERS OF

BESSEMER STEEL RAILS,  
RAILROAD IRON,

Forge and Foundry Pig,  
BEST DOUBLE-REFINED MERCHANT BAR IRON,  
CAR AXLES AND STRAP RAIL.  
ORDERS CAN BE FILLED AT ONCE.

## Iron.

## Warren Spike Works.

G. W. FAHRION,

Manufacturer of

Railroad, Ship and Boat

## SPIKES,

All Shapes and Sizes, Black  
and Galvanized.

Warren, Ohio.

J. & J. Rogers Iron Co.,  
AUSABLE FORKS,

Essex Co., N. Y.

Manufacturers of

## FINE CHARCOAL

## Blooms &amp; Bars

For Conversion into Cast Steel.

ALSO,

Horse Shoe, Round Square and  
FLAT IRON,

Exclusively from Palmer Ore.

Agents:

Merritt Trimble, 21 Platt St., N. Y.

John Moorhead, Pittsburgh, Pa.



Wrought Iron Buildings, Wrought Iron Bridges, Cor-  
rugated Iron Roofing, Shutters, Doors, Flooring, &c.  
Corrugated sheets of all sizes manufactured by Moseley  
Iron Bridge and Roof Co., No. 3 Dey St., N. Y.

Siemens' Regenerative  
GAS FURNACE.

RICHMOND & POTTS,  
119 S. Fourth St., PHILADELPHIA, PA.

## OLD DOMINION

Iron and Nail Works Co.,  
RICHMOND, VA.

R. E. BLANKENSHIP, Commercial Agent,  
Manufacture

## NAILS AND BAR IRON.

Bands, Scrolls, Horse Shoe Bars, Nut and  
Rivet Iron, Spike Rods, Wharfing, Bridge  
Bolts, Orbits, Half Orbits, Half Rounds, &c.



## JAS. CLAYTON,

Manufacturer of  
Water, Air, and  
Vacuum Pumps and  
Air Compressors.  
Send for Illustrated Cir-  
culars.

11 & 16 Water St.,  
Brooklyn, N. Y.

## W. D. WOOD &amp; CO'S

PATENT  
Planished Sheet Iron.

Patented March 14th, 1865; April 8th, 1873;  
Sept. 9th, 1873; Oct. 6th, 1874; Jan. 11, 1876.

Guaranteed fully equal in all respects to the

## IMPORTED RUSSIA IRON,

and at a much less price.

## FOR SALE,

by all the principal

## METAL DEALERS

In the Large cities throughout

## THE UNITED STATES.

And at their Office,

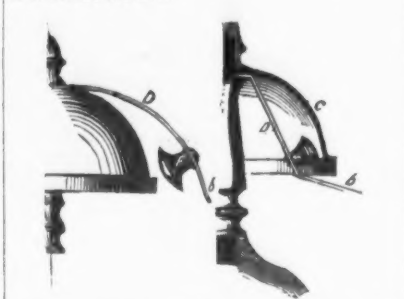
111 Water Street, PITTSBURGH, PA.

## New Patents.

We take the following abstract of new pa-  
tents, recently issued, from the official record:

CALL BELL.

To Elijah C. Barton, East Hampton, Conn.—  
Dec. 14.—The spring hammer is deflected by the  
finger, and when released its elasticity causes  
it to strike the bell.



The combination of the spring-hammer D E  
(with or without the finger piece b) with the  
supporting stand and bell or bell-shell of a  
table call-bell.

MANUFACTURE OF GRUBBING HOES.

To J. C. Klein, Pittsburgh, Pa.—Dec. 14.—  
Blank first swaged in dies to thin out and scarf  
the end; second, bent and welded; and, third,  
wages in finishing dies.

1. The herein described improvement in the  
art of forming the plate and eye of grub hoes,  
etc., consisting in, first, flattening the plate be-

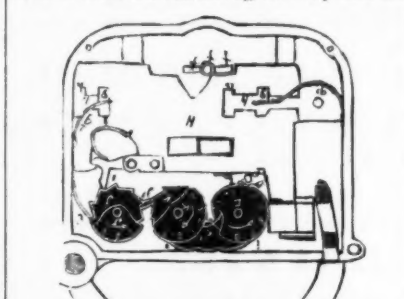


tween dies A B; second, bending and welding  
the eye on block G; third, setting down the  
metal around the eye, and forming the ridge on  
the blade by means of dies E F.

2. The dies A B, with recesses a b, for form-  
ing the flattened end C of the blank for grub-  
bing hoes, in combination with the plate D,  
provided with stud d and pin e, for bending and  
welding the eye, and the dies E F, having hole  
e and punch f, for finishing the grubbing hoes.

INDICATOR LOCK.

To L. R. Norman, St. Louis, Mo.—Dec. 14.—  
A pawl attached to the lock bolt is arranged to  
engage with a ratchet wheel attached to a dial,  
so as to move the dial one figure every time the



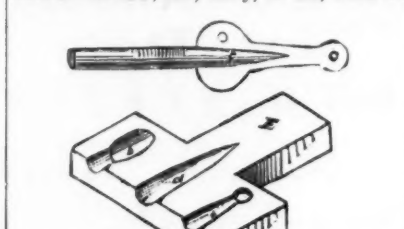
bolt is withdrawn, thereby indicating the num-  
ber of times the lock has been unlocked.

1. The lock bolt H, having spring pawl I, in  
combination with the dials J K L, and ratchet  
J K L.

2. The spring pawl or lever O, in combination  
with the dial L, and lock bolt H.

MANUFACTURE OF LAPS FOR SHOVELS.

To J. C. Klein, Pittsburgh, Pa.—Dec. 14.—A  
round rod is upset in dies to form a collar; then  
placed in die to taper it; then in die to form a  
bulb on the end; and, lastly, in die, when the



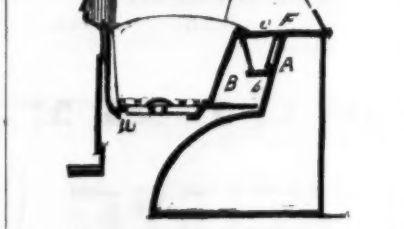
plane surface acts upon it, flattening it, except  
the rib.

1. The herein described improvement in the  
art of forming laps of fire and other shovels,  
viz. First, forming the collar on the bar;  
second, tapering the end and forming the  
bulb; and, finally, flattening and drawing out  
the end between dies.

2. The dies E F, with concavities d e d, for  
forming the taper, bulb, ridge and flattened  
end.

STOVE.

To Samuel Wood, Quincy, Ill.—Dec. 28.—The  
partition in the air chamber prevents circula-



tion of the air entirely through it longitudinally.  
Air is discharged through apertures into the  
space in the rear of the slotted fire brick.

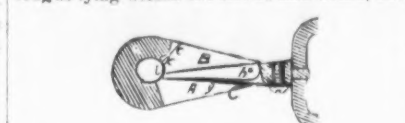
1. The air chamber C, having the apertures  
b, partition H, and covering F.

2. The fire plate B, having the slots i and bars  
n, in combination with the air chamber C.

3. The combination with the air chamber C,  
fire plate B and grate rest N.

## SNAP-HOOK.

To J. B. Tainter, Menomonee, Wis.—Dec. 28.—  
The snap-hook having the deep slotted shank  
A and the inclined spring-seat e, forming an an-  
gle therewith, the straight spring C, having its  
tongue lying within the slot of said shank, and



the broad sector-shaped plate-tongue B, having  
a beveled border, k, for the groove of the beak,  
a circular border, l, adapted to complete the  
circular eye, to effectually hold the ring in  
place therein, a, lying wholly within said slot  
of the shank.

## WIRE ROPE.

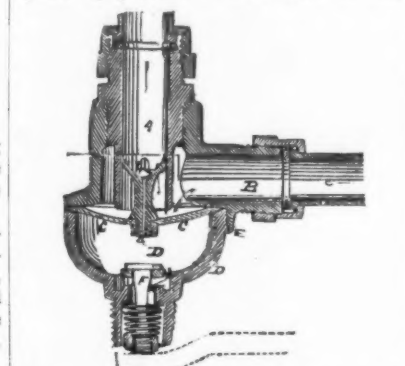
To Ferdinand W. Roebing, Trenton, N. J.—  
Dec. 28.—To prevent ropes used in mining, &c.,  
from twisting or untwisting. As an article of



manufacture a wire rope, composed of strands,  
one or more of which strands have a right-hand  
twist, and the remainder a left hand twist, said  
strands being laid up into a rope.

## WATER CLOSET VALVE.

To James P. Hyde, New York, N. Y.—Dec.  
28.—When the valve in the cup is opened the  
water discharges, and the flexible valve is  
opened by pressure of water upon its face,



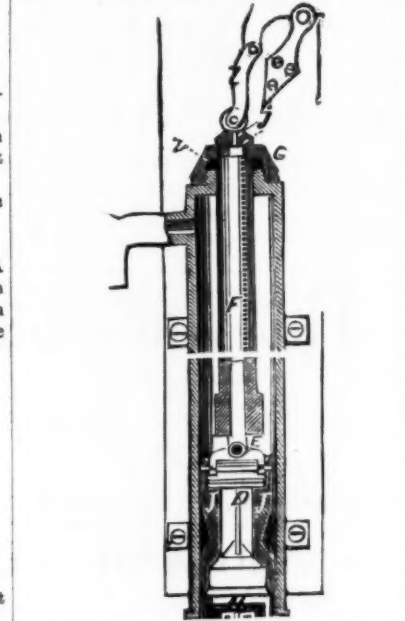
and is closed by counter pressure of water,  
which passes through the aperture in the valve  
and refills the cup.

1. The flexible valve C combined with the  
pipes A B and with the cup D, which has a dis-  
charge opening below said valve.

2. The combination of the valve F with the  
cup D, valve C and pipes A and B.

## PUMP.

To Wilson Barnes, Maquoketa, Iowa.—Dec.  
28.—The operating rod is made large and hol-  
low, with a small vent at the top, the effect of  
which is to maintain constancy of flow.  
Action of the plunger is rendered free by



a gimbal joint connecting it with the hollow  
rod.

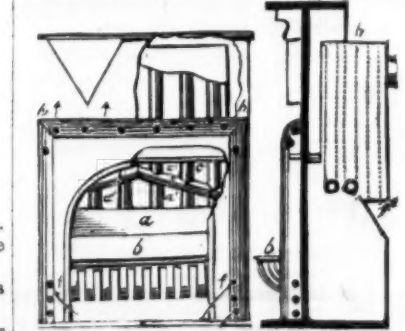
1. In a pump, the hollow plunger rod F,  
having vent j.

2. The combination of the hollow plunger  
rod F, having vent j, with the pump cylinder  
A and valve plunger D.

3. The plunger J, having a vibrating ball E  
and eyes u, whereby a universal joint connec-  
tion is obtained between the said plunger and  
its operating rod.

## FIRE PLACE.

To David Hayes, Chicago, Ill.—Dec. 28.—In a  
fire place heater, the chamber provided with the  
cold air openings f f' at its lower end, and

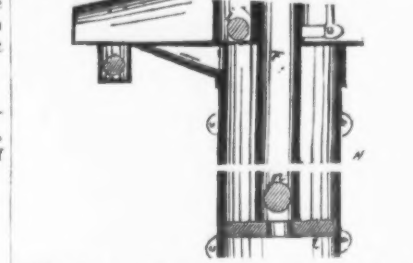


heated air tubes A A', in combination with the  
air tubes a' c', inclined air tube c, and open fire  
place b, having an inclined back, a.

## DOUBLE ACTING PUMP.

To Henry Van Doren, South Branch, N. J.—  
Dec. 28.—The upper portion, comprising the  
double discharge and induction chamber, is at-  
tached to a bottom plate provided with a down-  
wardly projecting flange, which fits upon (like  
a cover) the main cylinder. The induction  
chamber on one side, and containing one of  
the induct valves, prevents its acting as any  
impediment to the upward discharging water.

1. The hollow piston F, with plunger l and  
valve n, and the cylinder A, formed with open-  
ing h, in combination with tube D and cylinder  
E, and horizontal cylinder or water passage C,

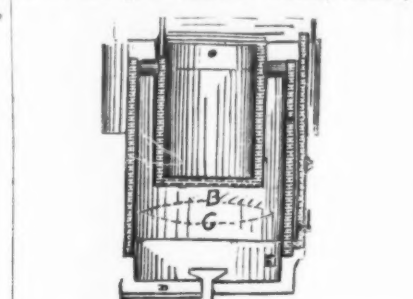


with valve c, said passage or cylinder having  
opening g, the same forming a charger or sup-  
ply for the main cylinder A.

2. The base plate B, with its water passages  
C D E, said plate having formed thereon a  
downwardly projecting collar or flange, d, for  
securely connecting the base plate to the cylin-  
der A.

## GAS STOVE.

To Henry Q. Hawley, Albany, N. Y.—Dec.  
28.—1. In a gas heating or cooking furnace,



the combustion chamber B, in combination  
with the double gauze G.

2. In a gas heating or cooking furnace, the  
combination of the plate d with the chamber  
B and double gauze G.

3. In a gas heating furnace used for boiling  
water or generating steam, and having the com-  
bustion chamber B and double gauze G, the  
boiler placed within said chamber in the man-  
ner described, so that it will throw back the  
heat against the gauze.

4. In the apparatus herein described, the  
hood H.

5. The double bottom E D, in a gas heating  
or cooking furnace, in which air is mixed with  
gas before combustion for the purpose of heat-  
ing the air before it is so mixed.

6. In a gas heating or cooking furnace, the  
double gauze screens made in a double curved  
form.

## Screws in Casings.

Mr. Griffiths, whose experiments with H. M.  
S. Bruiser have attracted much attention, has  
been making some further trials with models  
at the swimming bath of the Greenwich Hos-  
pital Schools. The results which he has ob-  
tained from these latter trials are somewhat  
remarkable. Taking two models, representing  
the type of the long narrow and the short broad  
ship, both of the same displacement, and being  
respectively 5 feet long by 7 1/2 inches beam, and  
3 feet 1 1/2 inches long by 14 inches beam, Mr.  
Griffiths showed, by towing them at the ends  
of a cross beam, that the resistance of the water  
on the long one was to that on the short one as 3  
to 5. On putting a pair of twin screws in the  
ordinary position at the stern of the long ship,  
and driving them for sixty seconds by means  
of a piece of clockwork machinery, the model  
was propelled through the space of 55 feet.  
The short vessel, however, with the screws in  
the same position, was only propelled, with the  
same machinery, through the space of 28 feet  
in sixty seconds; but when the screws were  
placed inside tunnel casings with lip orifices,  
the model was propelled through a space of 62  
feet, being, as will be seen, greater than that  
traversed by the long model when propelled in  
the ordinary manner. It was also found that,  
even when the screws were placed in the ordi-  
nary position in the short model, but the tunnels  
left open in front of them, a better speed was  
obtained than when the tunnels were closed,  
though not so good as when the screws were  
actually in the casings. The Engineer states  
that these results were considered of so much  
value by a gentleman representing the Imperial  
Russian government, who was present at the  
trials, that, at his suggestion, Mr. Griffiths has  
undertaken to have a model of a circular iron-  
clad made, and to conduct some trials there-  
with as to the difference of speed to be obtained  
by his system over that now used in the Pop-  
offka, the circular iron-clad.

The Great Britain steamer was one of the first  
made iron vessels, and among the earliest to  
ply regularly between New York and Liver-  
pool. She has lately arrived at the latter  
port from Melbourne, Australia, thus com-  
pleting her thirty-sixth trip round the world. She  
was designed by Brunel, and built at Bristol,  
and in July, 1845, made her maiden voyage  
from Liverpool to New York in 14 days. Her  
dimensions are: Length (extreme), 330 feet;  
breadth, 57 feet; depth, 32 feet; with engines  
by Penn., of 500 nominal horse-power. The  
weight of iron used in her hull alone is 1040  
tons, which is about equal to an average thick-  
ness of 2 1/2 inches. Since 1852, independent of  
her employment in the Crimea during 1854 and  
1855, she has sailed over 1,000,000 nautical  
miles, her last voyage out from Gravesend to  
Melbourne only occupying 51 days, and when  
recently surveyed, she was pronounced to be  
one of the strongest vessels in the mercantile  
marine.



## Iron.

CLEVELAND.

CLEVELAND ROLLING MILL CO.,  
MANUFACTURERS OF

## BESSEMER STEEL RAILS,

Plates and Forgings, Railroad Iron, Merchant Bar, Beams, Girders, Splices, Bolts, Spikes, &c., &c.  
Office, Nos. 99 and 101 Water St., CLEVELAND, O.  
A. B. STONE, Pres. H. CHISHOLM, V. P. & Gen. Supt.  
E. S. PAGE, Sec'y.

## Cleveland, Brown &amp; Co.

IMPORTERS, MANUFACTURERS AND DEALERS IN

## IRON AND STEEL,

HORSE SHOES, HORSE NAILS,

NORWAY NAIL RODS,

NAILS, SPIKES,

"Standard Taper" Axles & Swedes Iron,  
WINDOW GLASS,

Wrought Iron Pipe and Boiler Tubes,  
Nails, Rivets, Nuts, Washers, and Heavy  
Hardware Generally.

25 27, 29 & 31 Morwin Street,  
CLEVELAND, OHIO.

The Iron-Masters'  
Laboratory.

Exclusively for the Analysis of Ores of Iron,  
Pig and Manufactured Iron, Steels, Limestone,  
Clays, Slags & Coal for Practical Metal-  
lurgical Purposes.

No. 339 Walnut Street, Philadelphia.  
J. BLODGET BRITTON.

This Laboratory was established in 1866, at the instance  
of a number of practical iron-masters, expressly to afford  
prompt and reliable information upon the chemical com-  
position of the substances above mentioned, for smelting  
and refining purposes. The object being to make it at  
once a convenient, practically useful, and comparatively  
inexpensive adjunct to the Furnace, Forge and Rolling  
Mill.

## CHARGES TO IRON WORKS.

For determining the per cent. of Pure Iron in an  
ordinary Ore..... \$4 00  
For the per cent. of Pure Iron, Sulphur and Phos-  
phorus in do..... 12 50  
For each additional constituent of usual occur-  
rence..... 1 50  
For those of unusual occurrence or difficult to de-  
termine, the charge must necessarily depend  
upon circumstances.  
For determining the per cent. of Sulphur and Phos-  
phorus in Iron or Steel..... 14 00  
For each additional constituent of usual occur-  
rence..... 6 00  
For the per cent. of Carbonate of Lime, and in-  
soluble Silicious Matter in a Limestone..... 10 00  
For each additional constituent..... 2 00  
For the per cent. of Water, Volatile Combust-  
ible Matter, fixed Carbon, and Ash in Coal..... 12 50  
For determining the constituents of a Clay, Slag,  
Coke, or of an Ash of Coal the charge will correspond  
with those for the constituents of an ore.  
For a written opinion or letter of instruction the charge  
must necessarily depend upon circumstances.  
Printed instructions for obtaining proper average sam-  
ples for analysis furnished upon application.

WALLACE & HUMPHREY,  
Analytical Chemists,

113 Walnut St., PHILADELPHIA.  
Special attention given to analysis of Iron and Steel.

EDWARD HART,  
Analytical Chemist,

LAFAYETTE COLLEGE, EASTON, PA.

Edward J. Hall, Jr.  
BLAST FURNACE  
ENGINEER.

452 Franklin St., BUFFALO, N. Y.

Lord's Boiler Cleansing  
COMPOUND,

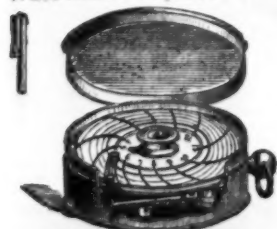
For removing Scale in Steam Boilers! For Prevent-  
ing the Formation of Scale in Boilers! For  
purifying Mine and Sulphur Waters!

GEORGE W. LORD, 238 Arch St., Phila.

HARDY & CO.,  
Manufacturers ofPolice & Fire Department  
SUPPLIES.

Brass, German Silver & Leather Dog Collars.  
102 ELM STREET, NEW YORK.

## Watchman's Improved Time Detectors.



U. S. Patent, April 22, 1873.  
N. B.—We will protect our customers against all  
claims of other Patents.

This is the latest and most com-  
plete instrument invented, with  
12 keys for HALLAM & CO.,  
312 Broadway, N. Y.  
P. O. Box 4798.

## Iron.

THE  
MILWAUKEE IRON CO.

Manufactures and Offers For Sale

## MERCHANT BAR IRON.

Flat Bars up to 6x2. Rounds and Squares up to 4 inch. Ovals, Half  
Ovals, Half Rounds, Box Iron Cylinder Bars, Plow Beam Iron, &c. Also,  
Hoop, Band, Horse Shoe and Shafting Iron of superior quality. A full assort-  
ment in store after February 1st.

## PIC IRON.

Superior No. 1 Foundry Iron constantly on hand. Bessemer Iron and  
Special Grades of Foundry Iron made on orders.

## RAILROAD IRON.

Thirty Patterns, from 30 to 65 lbs. per yard. Re-rolling done on short  
notice.

## RAILROAD SPLICES.

Fish Plates to fit all rails used in the West. Track Bolts made from Iron  
of superior quality. A large stock on hand. New patterns made promptly.

## CAR LINKS AND PINS.

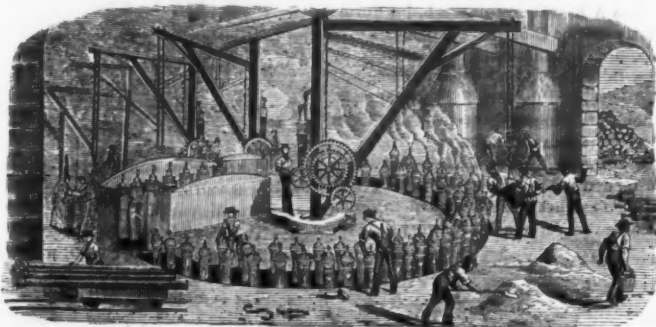
All patterns kept in store or made to order. Link and Pin Iron in stock.

## CAPACITY OF WORKS FOR 1876.

Merchant Bar Iron	20,000 tons.
Pig Iron	35,000 "
Railroad Iron	40,000 "
Railroad Splices and Couplings	5,000 "

Address all correspondence to

MILWAUKEE IRON CO., Milwaukee, Wis.

JOHN McNEAL & SONS,  
BURLINGTON, N. J.

Flange Pipes.

General Foundry Work.

CAST IRON PIPES  
FOR WATER AND GAS.JOHN H. REED & CO.,  
IRON MERCHANTS,  
And Agents for BAY STATE IRON CO.,

Manufacturers of and Dealers in

Homogeneous Boiler & Fire Box Plates, Plate, Sheet, Pig & Railroad  
Iron. Wrought Iron Girder, Channel & Deck Beams.

ANGLE and T IRON, BOILER and TANK RIVETS, Lap-Welded Iron Boiler  
Tubes, Wrought Iron Steam and Gas Pipes.

OFFICES, 2 Pemberton Square, Boston, Mass.

## The American Ice Chisel



Is superseding all others. It will save your time, save your ice, save your refrigerator, save your  
money. It shaves more rapidly than a Crusher, and splits as true as a saw. The blade is of the best Eng-  
lish Steel, carefully tempered. Address orders to,

## EDWARD J. HOLDEN &amp; CO.,

P. O. Box 2167,

Or No. 54 Beekman Street, NEW YORK.

JOHN CRANE, Agent, 103 Chambers St., N. Y.  
GREENSBORO' HANDLE WORKS.

Manufacturers of SPOKES and CARRIAGE WOOD WORK, AXE,  
PICK, German and American SLEDGE and other Handles.

Send for Catalogue and Price List.

## V. G. HUNDLEY.

79 Reade Street, New York. Agent for



## North Carolina Handle Co.,

(WILSON &amp; SHOBER, Proprietors.)

Manufacturers of SPOKES, AXE, PICK, SLEDGE, HAMMER, HATCHET, and other  
Handles. Full assortment always on hand.

## Iron.

**TAYLOR IRON WORKS**  
ON THE LINE  
CENTRAL N. J.  
HIGH BRIDGE, N. J.  
CAR WHEELS & AXLES  
MADE UNDER  
SAX & KEAR'S  
PATENT  
FOR LOCOMOTIVE  
AND TENDER  
PASSENGER CAR  
SERVICE

WHEELS  
AND  
AXLES  
MADE OF THE  
BEST STOCK  
AND IN THE MOST  
careful  
MANNER  
FURNISHED  
SEPARATELY  
OR  
"FITTED"  
MAKING  
COMPLETE  
SETS

DRAW HOOKS & FORGINGS.  
LEWIS H. TAYLOR PRES.  
S. P. RABER SUPY.  
JAS. H. WALKER  
SECY. & TREAS.  
NEW YORK OFFICE 93 LIBERTY ST.

## ATKINS BROTHERS,

PROPRIETORS OF THE

Pottsville Rolling Mills & Pioneer Furnaces  
POTTSVILLE, PENNSYLVANIA.

Having introduced New and Improved Machinery into their Rolling Mills, and manufacturing all their  
Iron from the ore, and also doing all Machine Work and Repairs in their own shops, they are enabled to  
produce

## RAILROAD IRON

Of uniform quality, unsurpassed for strength and wear, and of any required length.  
Address the Proprietors Pottsville, Pa.

## IRON FOUNDRY.

ESTABLISHED IN 1840.

## SAMUEL J. CRESWELL, Jr.,

OFFICE: 812 Race St. WORKS: Twenty-Third &amp; Cherry Sts.,

PHILADELPHIA.

## Iron Fronts, Stairs Girders, Lintels, Columns etc

## VERMONT SNATH CO.,

Springfield, Vermont.

Manufacturers of all kinds of

Scythe Snaths, Grain Cradles, Machinery Castings.

R. M. GREEN &amp; CO., Agents, 100 Chambers St., N. Y.

## JAMES C. HAND &amp; CO.,

Commission Merchants,

PHILADELPHIA.

AGENTS FOR THE SALE OF

FIG IRON, Wm. Penn, Norristown and Reading Furnaces.  
WM. JESSOP & SONS' Cast Steel, &c., &c.  
READING NAIL AND IRON CO.'S (Crescent Brand) Nails, Brads and Spikes.  
BARROW, SAVERY & CO.'S Tinned, Enamelled and Plain Hollow Ware, Mediam and Car-  
ron Hollow Ware, Sad, Tailors' and Laundry Irons, Fire Dogs, Wagon Boxes, Savery's Patent Combined  
Enamelled Water Cooler and Refrigerator, &c., &c.  
PENNSYLVANIA CORUNDUM CO.'S Corundum in Casks and Packages.  
WASHINGTON MILLS EMERY CO.'S Best Turkish Emery in Casks and Packages.  
FISHER & NORRIS' Patent American Anvils and Vises.

The Britannia Ironworks Company, Limited,  
Middlesbro' England,

MANUFACTURERS OF

## ALL DESCRIPTIONS OF IRON RAILS.

Surplus Stocks of Various Sections always on hand.

London Office: W. G. FOSSICK, 6 Laurence Pountney Hill, E. C.  
Weekly Output, One Thousand Tons.

## THE

## SWIFT MILL.

ESTABLISHED 1845.

The annexed cut shows one of the many  
styles of Coffee Mills of our manufacture, es-  
pecially adapted to Grocers' use and all retailers  
of coffee. They are highly ornamental, and  
workmanship of the very best. Silver Medal  
awarded at the Great Fair of American Institute  
last autumn. We make more than 30 styles.

ALSO

## Lane's Portable Coffee Roaster

Will roast 30 to 40 lbs. at once, and can be used  
as a stove at other times.  
Send for descriptive list.

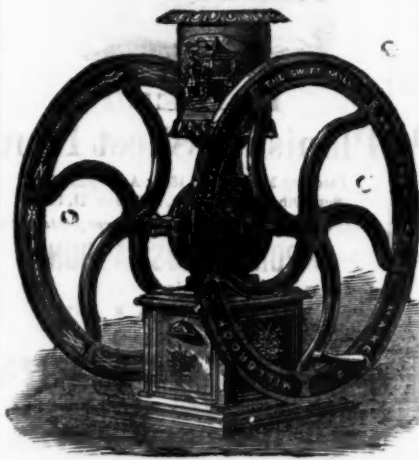
GENERAL AGENCY:

S. HAVILAND &amp; SON,

259 Pearl St., N. Y.

LANE BROS.,  
Millsbrook, N. Y.

Also sold by leading wholesale houses.



No. 16.

BUERK'S  
Watchman's Time  
DETECTOR.Important for all Large Corporations and  
Manufacturing Concerns.

Capable of controlling with the utmost accuracy the motion of a watchman or patrolman as the same  
reaches different stations of his beat. The instrument is complete in itself, portable and as reliable as the  
best lever watch. It requires no fixture or wires communicating from room to room, as is the case with the  
ordinary watch clocks. A small inexpensive stationary key is alone required at each station. The instru-  
ment will, in all cases, be warranted perfect and satisfactory.

CAUTION.—The public are notified that in my suit against Imhueser & Co., of New York, a decree  
was made in my favor, June 10, 1874.

Proceedings have been commenced against said Imhueser & Co., for selling clocks contrary to the  
order of the Court, and especially the clock with a series of springs in the cover, and marked "Patented  
Oct. 30th, 1874." All persons discovered using these infringing clocks will be dealt with according to law.

J. E. BUERK, Proprietor,

P. O. Box 970.

No. 230 Washington Street, Boston.

In sending for circular or ordering the above, please mention this paper.



# W. & B. DOUGLAS,

MIDDLETOWN, CONN.

The Oldest and Most Extensive Manufacturers of

## PUMPS, HYDRAULIC RAMS, GARDEN ENGINES

AND OTHER

### Hydraulic Machines

IN THE  
WORLD.

Awarded the GRAND MEDAL of PROGRESS at WORLDS' EXPOSITION, VIENNA, 1873, being the highest awards on Pumps, &c., also, highest medal at PARIS in 1867.

Descriptive Catalogues and Price Lists sent when requested.

#### BRANCH WAREHOUSES,

85 & 87 John Street, N. Y.

AND

197 Lake St., CHICAGO, ILL.



MORE THAN 10,000 IN USE!!

## BLAKE'S

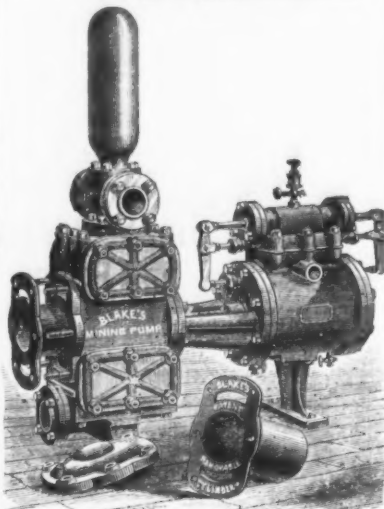
PATENT

### Steam Pumps.

STRONG!

COMPACT!

SIMPLE! and  
DURABLE!



MORE THAN 10,000 IN USE!

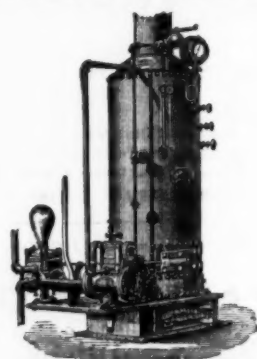
Boiler Feed Pumps,  
Tank or Light Service Pumps,  
Mining Pumps,—Piston or Plunger Pattern.

Brewer's Mash and Beer Pumps,  
Brewer's Water and Air Pumps,  
Marine Circulating Pumps,  
Marine Bilge and Fire Pumps,  
Special Fire Pumps,  
Tannery Pumps,  
Marine Air Pumps,  
Wrecking Pumps,  
Oil Refinery Pumps,  
Oil Line Pumps,  
Blowing Engines,  
Sugar House Pumps,  
Vacuum Pumps—Fly Wheel Pattern,  
Plunger Pumps—Double Acting,  
Plantation Pumps,  
Locomotive Pumps,  
Hydraulic Pumps,  
Low Pressure Pumps,  
Air Pumps,—Direct Acting.

#### Combined Boiler & Pump.

Acid Pumps,—Of Pure Composition,  
Drainage and Irrigating Pumps,  
Gas Works Pumps,  
Lard or Soap Pumps,  
Bleachery Pumps,  
Vinegar Pumps,  
Quarry Pumps.

MORE THAN 10,000 IN USE!



Cut above represents Pump and Boiler combined with fixtures complete for Railroad Water Stations, Hotels, Factories, &c.

Send for Illustrated Catalogue to

## Geo. F. Blake Mfg. Co.,

86 Liberty Street,  
NEW YORK.

Cor. Causeway & Friend Sts., Boston.

50 & 52 S. Canal St., Chicago.



#### HOG and PIG RINGER.

Patented March 17, 1874.  
MAKES TWO SIZED RINGS. Satisfaction guaranteed. Send for prices.

E. BLAIR, Bucyrus, O.

#### Gas Fixtures.

The manufacture of gas fixtures is of modern date, and has become one of the most important industries of the day, considering both the utilities it serves and the sense or love of beauty to which it administers. A few years ago the majority of gas fixtures used throughout the world were manufactured in Europe, principally in England and France, and chiefly by small manufacturers.

The extent and importance of the manufacture of gas fixtures in this country will be apparent on reflecting that in nearly all the houses in the great cities, and in nearly every village having a population of four or five thousand, they are now in use. There are a great number of isolated residences in the country, the owners of which manufacture their own gas by private methods, and whose houses require the gas fixtures. The demand for these wares is increasing every day.

Entering a manufactory, the visitor proceeds, perhaps, first to the modeling rooms. A single firm have in their employ several designers or artists who occupy separate rooms, in different parts of the building, and who do not intercommunicate, each depending upon his own unaided genius in devising sketches for the models. Thus greater originality of design is accomplished. Following a design which is given him, sketched upon paper, the modeler proceeds to mold into required shape a mass of prepared wax. After the design is "roughed out" he consummates his task with the aid of tools made of hard wood or steel. When the pattern, frequently the work of weeks, is completed, it goes in the hands of the "caster," who makes a mold of it in brass, which is sent to the "chaser," and is elaborated into a standard pattern, from which the caster may multiply an infinitude of copies. It is a very nice operation to make a mold from an original wax pattern, the fragile material rendering it necessary to use every precaution in obtaining a brazen fac simile of the original. Much depends on the "chaser." When the first brazen copy of the pattern is placed in his hands, the embellishments on its surface are faint and require to be deepened. The partially developed fibres and veins of leaves and flowers, the feathers of birds and fur of animals, are by him made distinct. He uses small steel chisels, of various shapes, with which the necessary indentations are made by sharp blows of a light hammer. The completed pattern is returned to the caster. In casting a drooping feather, or a crumpled vine leaf, for instance, it is found more expeditious to flatten the pattern. After the casting is finished, the proper curves are given to the hitherto flat surfaces by means of wooden mallets and other tools.

In the casting rooms, where many men are employed, the heat from the furnaces is very great, and becomes almost stifling, in conjunction with the sulphurous fumes of the liquid mass of mingled copper and spelter, forming brass, which is glowing and seething in black lead crucibles placed in the midst of fiery anthracite. Each caster works at a wooden trough, into which he carefully sifts prepared sand, slightly moistened. Thus prepared the sand is placed in flasks, and the process of molding, sufficiently understood by general readers, is proceeded with. After the crucibles have been emptied into the molds a few minutes suffice for the lately molten brass to chill into a hardness which permits the flasks to be opened, by removing the clamps, when it is a matter of surprise to note how faithfully the finest chased work has been transferred from the original pattern to the copy.

The castings are conveyed from the foundry to the filing department. Here scores of files create a constant din, not musical to all ears. The castings are first "edged up" with coarse rasps, and then finished with finer tools. In many instances a number of castings must be joined to form one piece. The several parts are conveyed to the soldering room, where they are properly fitted together, care being taken to leave one edge more prominent than the other. The sections are then put into their proper places, and retained in position by iron wire. Particles of brass solder, which look like brazen sawdust, are wetted with water and borax and carefully applied along the projecting edge of the section. The entire piece is then placed in a furnace, where the solder is melted. The work then undergoes another filing. The joints must be made with the utmost care, for the subtle gas would escape through any tiny opening left in the work. Before the castings leave the filing and soldering rooms, there is frequently much to be done in the way of the twisting of branches, crumpling of leaves, drilling of holes, etc., etc.

The castings are taken after the re-filing, etc., to the dipping room. Here everything is done by means of chemical agents. The room is a perfect laboratory in itself. There are ranges of monstrous stone jars filled with divers colored acids, of different degrees of strength; pans and kettles filled with various liquids, and hot, lukewarm and cold water is flowing in abundance. When the castings leave the hands of the filers they are dirty and discolored, and more or less sand or other foreign matter clings to them. The first act of the dipper is the taking up of a casting with a pair of tongs, and dipping it into a jar of acid. Only a moment is required to remove by this process every particle of dirt from the surface of the piece. The chemical would soon devour the piece itself if sufficient time were given it. But the dipper speedily takes out the cleansed metal and places it in water, which arrest the ravages of the acid. The operation of plunging the metal into acid is called "pickling." The color of the metal is rendered by it essentially brass-like, as the "pickle" has devoured the foreign substances on its surface. The article thus cleansed is then dipped into the jar, the contents of which are a mystery to us. This has the effect to give the surface a rich sulphur color. This operation occupies but a moment. The piece of metal is again washed in clean water, and is then plunged into a chemical combination called an "ormolu;" in a few minutes the color of the metal is changed to a dirty yellow. The ormolu is then washed off, and the surface of the metal is found to have been eaten into minute molecules. One more dip into an acid, which gives the brass a rich, pale gold color, finishes the chemical ordeal. After the piece is again cleansed in water, it presents a rich and uniform, though dull gold color. This dullness forms a good foil, and contrasts finely with the prominent parts of the design, which are afterward richly burnished, the ormolu having prepared the surface for that operation.

In an apartment adjoining the dippers is another one in which the coating of the brass which has passed the ormolu process is carried on. The galvanic battery is here put in use. The piece of brass is put in connection with the battery, and is made to form the negative pole of the instrument. A bar of pure silver acts as a positive pole. The brass is then held in a solution, and the bar of silver is played around it under the surface for a few seconds, which suffices to precipitate upon the negative pole, or piece, a coat of silver thick enough to bear without injury the action of the burnishing instrument.

Burnishing is an important process in the manufacture of gas fixtures. The tools used are of a great variety of shape, and during the process of burnishing are frequently dipped into a dark colored liquid, which on inquiry we find to be simply small beer. The parts of the surface of the metal which are not burnished are "dead" or "matted" as they come from the ormolu. Much of the beauty and character of the work depends upon a judicious selection of the parts to be burnished. It is to the proper development of the design, what lights and shades are to a good picture.

The process of lacquering, which is a very important one, is carried on in a room supplied with stoves, which are kept in all seasons constantly heated. Here the various articles are placed upon hot iron after being carefully brushed. When heated to a certain degree, the articles are taken to a table, where the lacquer is applied with fine, flat brushes. Some articles are dipped into the lacquer, and "slung" backward and forward, in order to make it certain that the lacquer is properly spread over their surfaces. The lacquer must be scientifically prepared and skillfully applied to insure a rich and lasting gold color, unaffected by the action of the atmosphere.

The different parts and ornaments, after undergoing the processes described, are ready to be placed in the hands of the fitter or finisher, and are selected and taken to the respective places for putting them together. One room is occupied entirely by a number of men who are constantly employed in fitting together such gas work as chandeliers, pendants, brackets, etc.; another room is devoted to the numerous class of solar lamps designed for standing upon the table, or to be suspended from the ceiling or against the wall. Some of the ornamental work is painted in party colors, to please fanciful taste; some is bronzed in different shades, while other work is covered with a coating of fine gold, or tastefully enamelled.—The Metal Worker.

A New Cause of the Breakage of Railroad Rails.

Some interesting observations have recently been made on an Austrian railway line, which possibly may shed considerable light on the hitherto unexplained cause of the breakage of steel rails during cold weather. Cases have frequently occurred when such rails have been fractured, and yet the adjacent metal has presented no flaw to which the rupture could be traced.

The section of the Austrian road referred to is about eight miles in length, and is often blocked with snow. This obstacle is generally surmounted by throwing sand in front of the driving wheels of the locomotives and in putting on extra steam while running over the slippery section. The rails are of Bessemer and Martin steel, weighing about 63.8 lbs. to the yard. It was suggested that the sanding of the tracks caused them to heat, to be suddenly cooled again, however, by the low temperature of the air and by the falling snow. Beside the molecular construction of the metal being thus injured, there would be an extra amount of abrasion on the surface at the spots where stoppages occurred.

Examinations proved, says the Ironmonger, that these abraded portions varied in length from 2 to 9 English inches, one-twelfth to one-quarter inch in depth, and extended over the whole breadth of the rail. A train, in passing over the depressions so caused, necessarily experiences a certain shock; and it is reasonable to suppose that the concussion thereby communicated to the rail will be most felt when the ground beneath is frozen hard, so that the natural elasticity of the rail has no room to play. In three instances, rails so worn snapped asunder suddenly at the abraded portion, although no flaw or defect in the metal could be detected. This led to the removal of all abraded rails from this section of the line, amounting to 28 lengths of Martin steel rails, and 10 lengths of Bessemer rails. No similar case of fracture is known to have occurred in the iron or puddled steel rails previously in use, although the amount of abrasion they underwent must have been at least as great. The inference is that the improved rails of Bessemer and other steels, their superior strength notwithstanding, are less capable of withstanding concussion than the older rails, and consequently whenever they are used increased vigilance is requisite to prevent accidents in the winter time.

## UNION MANUFACTURING COMPANY,

Manufacturers of all styles Plain and Ornamental Butts

#### LOOSE PIN REVERSIBLE,

### Cast Fast & Loose,

Drilled and Wire Jointed.

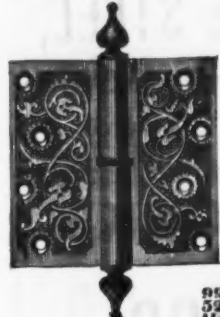
Japanned, Figured Enamelled, Nickel Plated, and Real Bronze Butts. A full line of

#### IRON & BRASS PUMPS,

Cistern, Well, and Force Pumps, Yard, Drive Well, Garden Engine and Steam Boiler Pumps, Hydraulic Rams, etc., and all with the most modern improvements. 10 Fine Castings a Specialty.

NEW BRITAIN, CONN.

Warehouses,  
99 Chambers St., N. Y. 67 Kilby St., Boston, (Pumps.)  
52 Washington Square, Boston, (Butts.)  
Heaton & Henkle, 507 Commerce St., Phila., (Butts.)  
Send for Illustrated Catalogue and Price List.



## THE LARGEST PUMP WORKS IN THE WORLD.

Over 800 Different Styles

Pumps, Steam Pumps, Rotary Pumps, Centrifugal Pumps, Piston Pumps,

for Tanners, Paper Mills, Fire Purposes, suitable for all situations imaginable.

#### Also, HAND FIRE ENGINES.

Send for Catalogue. Address.

## RUMSEY & CO.,

SENECA FALLS, N. Y., U. S. A.

Branch House, No. 93 Liberty Street, New York.  
LINFORTH, KELLOGG & CO., San Francisco, Cal.,  
GENERAL AGENTS FOR THE PACIFIC COAST.

L. M. RUMSEY & CO.,  
Branch House, 811 N. Main Street, St. Louis, Mo.



## Improved Reversible Butts.

### PATENTED.

This Butt avoids all of the objectionable features of the Common Reversible, and offers the following improvements:

1. It prevents the possibility of the pin raising in use. This is accomplished by a three sided plug (A), which, when the hinge is closed, fits into the notches (B B). As the working up of the pin is necessarily very gradual, it is pressed back each time the door is closed.

2. Driving out the pin when desired is easily done by merely tapping under the plug at A.

3. It is impossible for the door to be opened from the outside by removing the pins, as this cannot be done when the Butt is closed. This is a valuable feature in the case of doors opening on porches or halls.

These goods are sold on the same list and as low as the old style Reversible, and are fast superseding them.

Sample by mail when requested.

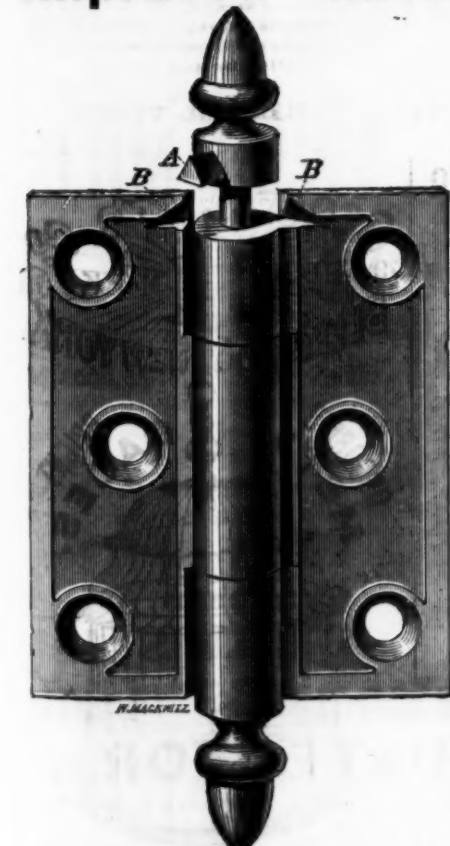
#### Western Butt Co.,

Sole Manufacturers,

### Semple, Birge & Co.,

Sole Agents,

SAINT LOUIS, MO.



## RHODE ISLAND HORSE SHOE CO.,

OFFICE, 81 Canal Street, Providence, R. I. WORKS at Valley Falls, R. I.

Manufacturers of

PERKINS and RHODE ISLAND PATTERNS of

### HORSE AND MULE SHOES.



# USE THE BEST.



Pawtucket, R. I.

The American File Company have the exclusive right to use the Bernot process for cutting files. By this method all the advantages of hand cutting are secured, together with an accuracy unattainable in hand work. They are the only manufacturers who employ machinery for testing files and steel.

Goods of all known manufacturers have been repeatedly tested, and interesting tables have been compiled showing the working qualities of files made by different makers, and of files made from different steels, and with various shapes and angles of tooth. They have thus reduced the manufacture of files to an exactness and perfection with a uniformity of result, as they believe, never before attained. No file, foreign or domestic, that they have ever tested, has equalled the performances of their own goods taken at random from their stock. Their machines are capable of the most delicate adjustment, and can produce the very finest work known to the trade. Special files made to order. Prominent file manufacturers are having their best goods from our works.

Price lists and information furnished on application.

AMERICAN FILE CO., Pawtucket, R. I.

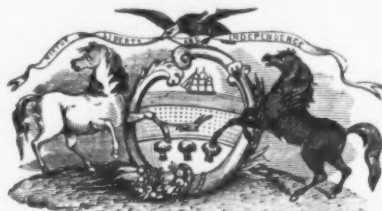
## THE BEST IS THE CHEAPEST.

McCaffrey's Standard American Hand Cut Files and Rasps are warranted to do more work than any other files and rasps in the market.

SILVER MEDAL

TRADE MARK.

HIGHEST PREMIUM.



PENNSYLVANIA FILE WORKS.  
McCAFFREY & BRO.,

No. 1732, 1734 & 1736 North Fourth St., Phila.

Messrs. ARNOLD & CO., 310 California St., San Francisco, Sole Agents for the Pacific Coast.

ESTABLISHED 1848.

C. T. DRAPER & CO.  
Sing Sing, N. Y.  
Manufacturers of  
HAND CUT  
FILES AND RASPS



FILES AND RASPS  
Made from Best  
ENGLISH CAST STEEL.  
Quality guaranteed by written warranty  
when required.

JOHN ROTHERY'S  
Celebrated Hand-Cut FILES,

Made of Best English Cast Steel.

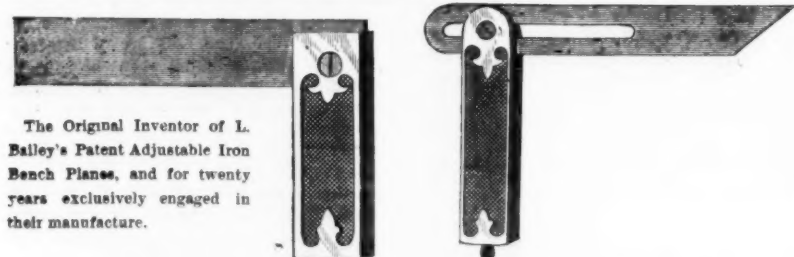
WALSH, COULTER & FLAGLER, Sole Agents,  
83 Chambers and 65 Reade Streets, N. Y.

CHARLES B. PAUL,  
HAND-CUT FILES. Warranted  
CAST STEEL.

187 Tenth Street, Williamsburgh, New York.

All descriptions of Files made to order. Price List mailed on application.

Established 1843



The Original Inventor of L.  
Bailey's Patent Adjustable Iron  
Bench Planes, and for twenty  
years exclusively engaged in  
their manufacture.

LEONARD BAILEY & CO.,

Manufacturers of

SUPERIOR

Mechanics' Tools.

TRY SQUARES, BEVELS, I&C.

Cushman Street,

HARTFORD, CONN.

ELIAS G. HELLER.  
JOHN J. HELLER.



GEORGE E. HELLER.  
JOHN J. HELLER.

Horse Rasps  
and Files,

made from the very best American Steel, all cut by hand,  
and warranted to give entire satisfaction. If requested,  
we will send sample lots, to be returned, or held subject  
to our order, free of all charges, if not found as repre-  
sented. All rasps not stamped as the annexed incor-  
porated trade mark are not genuine. Sold by Hardware  
dealers generally.



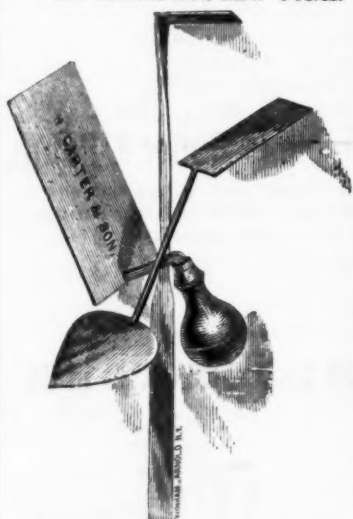
Putnam's Government Standard  
FORGED

HORSE SHOE NAILS.

Manufactured from the best of NORWAY Iron,  
and warranted to give entire satisfaction.

S. S. PUTNAM & CO.,  
NEPONSET, MASS.

H. CARTER,  
290 PEARL ST., NEW YORK.



Molders' and Plasterers' Tools.

Manufacturers of and Dealers in all descriptions of  
Molders and Plasterers' Tools, and Dealers in  
General Hardware, Glazed Copper Weather Vanes,  
CARTERS' PATENT CARRIAGE LIFTING JACK, &c.

A. PARDEE, Hazelton, Pa.

J. G. FELL, Phila.

A. PARDEE & CO.,  
303 Walnut St.,  
PHILADELPHIA.

MINERS AND SHIPPERS OF

Lehigh Coals.

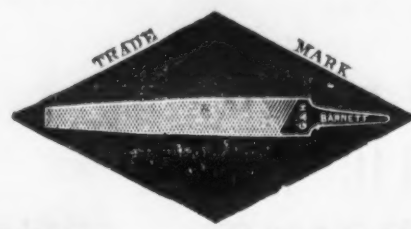
The following superior and well-known Lehigh Coals  
are mined by ourselves, and firms connected with us,  
viz.

A. Pardee & Co. { HAZLETON, CRANBERRY, SUGAR LOAF  
G. B. Markle & Co. { JEDDO, HIGHLAND.  
Pardee, Bro. & Co. LATTIMER.  
OFFICES:  
WM. LILLY, Mauch Chunk, Pa.  
WM. MERSHON, Agent, 111 Broadway N.Y.  
WM. H. DAVIS, Agent, Easton, Pa.

Lehigh Valley Coal Co.,  
MINERS AND SHIPPERS OF  
Lehigh, Wyoming White & Red Ash,  
(BALTIMORE VEIN).  
Office, cor. Fairland & Church Sts.  
Coal and Iron Exchange Building.  
GEORGE H. NEWTON, Agent. Shipments by Rail-  
road and Morris Canal direct from the mines, and from  
Perth Amboy and Jersey City, for all Points.

## Black Diamond File Works.

Send for illus-  
trated Price List.



Send for illus-  
trated Price List.

G. & H. BARNETT. 39, 41 & 43 Richmond St. Phila.  
LINFORTH, KELLOGG & CO.

Sole Agents for the Pacific Coast, 3 & 5 Front St., San Francisco, Cal.  
St. Louis, Mo., SEMPLE, BIRGE & CO., Agents.  
THOS. TAYLOR, 43 Chambers St., N. Y., Agent for N. Y. and N. E. States.

Established 1816.

Peter A. Frasse & Co.,

95 Fulton Street, New York,

SOLE AGENTS FOR

Thomas Turner & Co.'s Suffolk Works,  
SHEFFIELD.

FILES AND HORSE RASPS,

And Importers of

P. S. STUBS' FILES, TOOLS & STEEL,  
W. J. Davies' Sons' London Emery Cloth,  
HUBERT'S FRENCH EMERY PAPER.

AUBURN FILE WORKS,

Superior Hand-Cut

FILES AND RASPS,

MADE FROM IMPORTED STEEL. EVERY FILE WARRANTED.

FULLER BROS., Sole Agents,  
89 Chambers and 71 Reade Streets, N. Y.

G. WEBSTER PECK,

Manufacturers' Agent, 110 Chambers Street, N. Y.

Representing:

RACINE HARDWARE MFG. CO.,

Flower Pot Brackets, Aquaria and all kinds of Florists' Goods, Jewel-  
ers' Machinery and Builders' Hardware.

CHARLES GOOCH,	Ice Cream Freezers.
ATHRO MACHINE CO.,	Bit Braces and Flower Stands.
AMERICAN CROQUET CO.,	Croquet.
ALEX. M. LESLEY,	Refrigerators.
B. L. WALKER,	Lawn Mowers.
JOHNSON & BRO.,	Hand Made Files and Rasps.
BENJ. F. BADGER,	Razor Straps.
PEEK & SKILTON,	Rustic Work.
PALMER & SKILTON,	Nickel and Laminas Ware.
ED. O. CHASE,	Scroll Saws and Lathes.

Depot for

SIMPSON'S ADJUSTABLE PARELLEL VISES.

Send for Price Lists.

The Conn. Valley Mfg. Co.

CENTERBROOK, CONN.

Manufacturers of

Lewis Patent

Single Twist Solid

SPUR BITS,

Mechanics' Double

Twist Auger Bits,

Machine Bits,

both Single and Double

Twist.

Patent Countersunk Bits,

Double Cut

Gimlet Bits,

Metal Head Gimlets,

REAMERS,

Screw Driver Bits, &c.

—O—

The Lewis Pat. Bits

are superior to any others

in the market. They are

made of best cast steel

and combine the advan-

tages of Jennings Bits,

Cook's Bits and the Ship

Augers.

Send for price lists and

discounts.

FILES & RASPS,

Established 1868.

Best Cast Steel.  
HAND-OUT. Manufactured by  
JOHNSON & BRO.  
No. 1 Commercial Street, Newark, N. J.



The Original Inventors and Manufacturers of the  
OSBORN BRIGHT METAL CAGES.

Also OSBORN & DRAYTON improvements under  
twelve different patents. We are continually bringing  
out new and beautiful designs to meet the demands of  
refinement and taste.  
ALVAN DRAYTON General Agent



# OTIS PASSENGER —AND— FREIGHT ELEVATORS

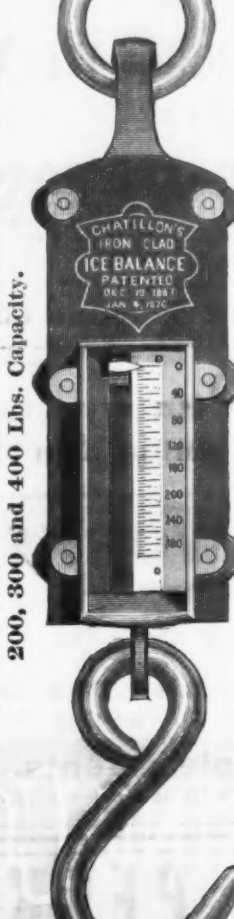
For HOTELS, OFFICE BUILDINGS, STORES,  
WAREHOUSES, FACTORIES, MINES,  
BLAST FURNACES, &c.

OTIS BROTHERS & CO.  
SOLE MANUFACTURERS,  
348 Broadway, New York.

## HOISTING

Machinery  
Made by  
CRANE BROS.  
MFG. CO.,  
Chicago.

## IRON CLAD ICE BALANCES.



200, 300 and 400 Lbs. Capacity.  
SUPERIOR to any other  
ICE BALANCE in the market.  
Correct, Compact, and Durable, not liable to get out of order.  
Manufactured only by JOHN CHATILLON & SONS, 91 & 93 Cliff St., N. Y.

## OSCAR BARNETT, Hardware and Machinery.

Gray Iron Foundries & Machine Works,  
Hamilton, N. Y. and New York City.  
Malleable Iron Works,  
N. J. R. R. Avenue, cor. Johnson Street, Store, 34 &  
36 West 14th Street, NEW YORK, N. Y.  
Tinning, Gas-fitting, Coppering and Japaning. Small  
Gray Iron Castings, Soft and Smooth.  
P. O. Box 34. Established 1845.

## MANILA Water Pails.

These goods we warrant not to be affected by  
climate, or WATER, HOT or COLD.  
Are Durable, Light, Strong and Tasteless,  
HAVE NO HOOPS, and will not absorb their  
contents. Orders from the trade solicited.  
For samples or circulars, address,

W. F. HYATT,  
Manufacturers' Agent,  
34 BEEKMAN ST., - NEW YORK.



ROMER & CO.,  
Established 1837. Manufacturers of Patent Scandinavian  
or Jail Locks. Brass Pad Locks for Railroads and  
Switches. Also, Patent Stationary R. R. Car Door  
Locks, Patent Tins and Sewing Machine Locks.  
141 to 145 Railroad Avenue, NEWARK, N. J.  
Illustrated Catalogue sent on application.

EDWARD SWEENEY, Brass Founder,  
Manufacturer of

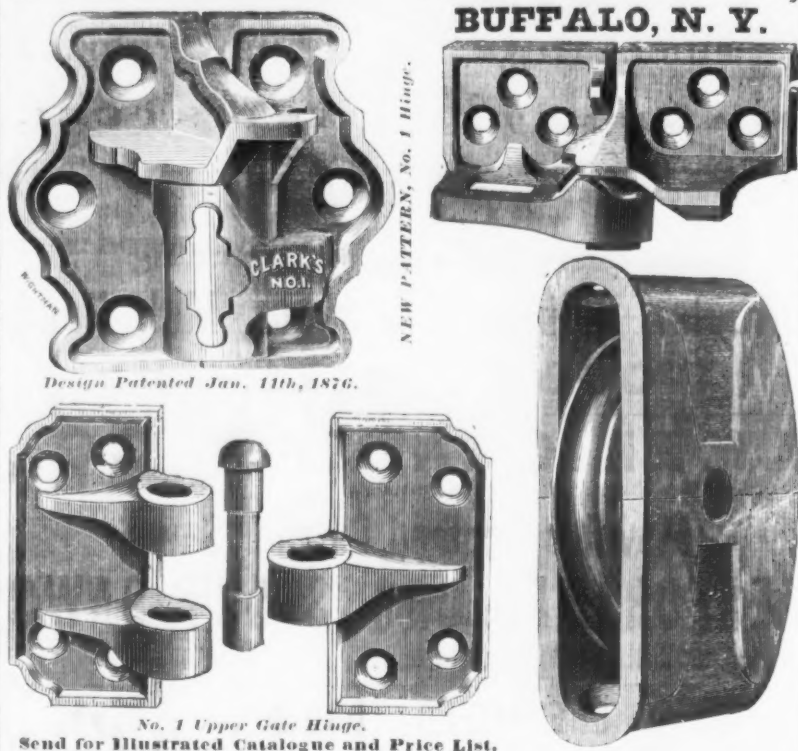
## GONG BELLS

Steamboat and Locomotive Gongs kept on hand. A  
liberal discount to the trade. Bell Hanging and Jobbing  
done to order. 4 DIANE STREET,  
Bet. Rose and William Sts., NEW YORK.

GEORGE W. BRUCE  
No. 1 Platt Street, N. Y.

Agent for Clement & Maynard's  
val-Ed Planter's Rice & Case Hoe, & Handled  
Street, Mortar, Planter's & Field Hoes.

## CLARK & CO., MANUFACTURERS OF BUILDERS' HARDWARE, BUFFALO, N. Y.



Design Patented Jan. 11th, 1876.

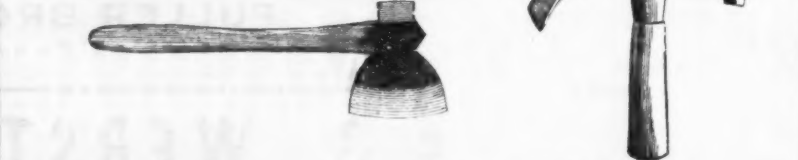
## MACK & CO.

Successors to  
D. R. BARTON & CO.,  
At the Old Stand, 136 Mill St., ROCHESTER, N. Y.

Sole Manufacturers of the  
D. R. BARTON & CO. BRAND OF



## Carpenters' Coopers' and Pump Makers' TOOLS.



## Large Knives and Barrel Machinery.

All Tools made by us are stamped D. R. BARTON & CO.,

All goods stamped D. R. Barton & Co., are made at the Old Works, and by the old men, from the B  
English Steel, manufactured for us by Thos. Firth & Sons and Wm. Jesson & Sons, and fully warranted.  
Goods stamped D. R. Barton are not made at the Old Works of the company but by a new stock company  
formed about the time of Mr. Barton's decease.



## THE HURRICANE FORGE.

(Patterson's Patent.)  
Prepared to Supply all Orders Promptly.  
Send for Prices and further information.

GEORGE PLACE, General Agent,  
191 Chambers & 103 Reade Sts., N. Y.

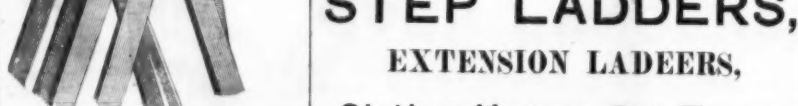
## F. F. ADAMS & CO.

ERIE, PA.,  
MANUFACTURERS OF

## Pat. Wooden Articles.

We make a specialty of

WALNUT and ASH WAINSCOTING,  
STEP LADDERS,  
EXTENSION LADEERS,  
Clothes Horses, Rat Traps,  
TOWEL ROLLERS, &c.,  
AND HAVE THE  
Best Facilities for the manufacture of Straight  
and Irregular Turned Work.



## LOVELL'S Automatic Lock Hinge STEP LADDER.

The Best and Cheapest in  
the World.

The following is a partial list of the Jobbing Houses that keep our goods in stock:

Pratt & Co., Buffalo, N. Y.	Ames Plow Co., Boston, Mass.	Thos. Holliday & Co., Cincinnati, O.
C. H. Walbridge & Co., "	W. H. Banks & Co., Chicago, Ill.	W. P. Kurtz & Co., "
John H. Hill, Rochester, "	David Landrath & Son, Phila., Pa.	McIntosh, Good & Co., Cleveland, O.
L. L. Thurwath, Syracuse, "	Griffith & Page, "	Bingham & Williamson, "
S. & P. Templeton, Albany, "	Thos. Norris & Son, Baltimore, Md.	Foe & Breed, Toledo, O.
E. A. Burrows & Co., Troy, "	J. Seth Hopkins & Co., "	Ketcham & Volt, "
Hopping Bros. & Osburn, New York.	Lindsay, Sterrett & Co., Pittsb'g, Pa.	Jno. H. Thomas & Co., Louisville, Ky.
J. H. Knapp & Co., "	Buhl, Ducharme & Co., Detroit, Mich.	Morrison Bros. & Co., Hamilton, Ont.

## BUSINESS ITEMS.

### MASSACHUSETTS.

The old firm of Dutton & Pierson, the largest  
hardware dealers in Pittsfield, have dissolved,  
Mr. Dutton retiring, and Mr. Pierson taking his  
son, Henry R., as partner.

Work is about to close at the Colby Iron ore  
bed at Lanesboro, where a few men have been  
employed since the furnace shut down last  
spring. Mr. Colby has about 500,000 bushels of  
charcoal piled up at the furnace, and had some  
10,000 cords of wood down when the furnace  
closed, and some contracts for cutting are not  
yet worked out.

Hayden, Gere & Co. are settling with those  
of their workmen who desire to go away, and  
give work to those wishing to stay at the re-  
duced wages. They say they can get all the  
help they want in these dull times. Meantime,  
the workmen advertise, warning their fellow  
craftsmen against coming to Haydensville.

The Valley Machine Co., at Easthampton,  
have nearly completed the pumps they propose  
to send to the Centennial.

J. R. & J. E. Prouty, of Spencer, have at  
length sold their wire works, two miles north  
of the village, to the Washburn & Moen Manu-  
facturing Company, of Worcester, possession to  
be given April 1. It is understood that the  
business will be carried on by a joint stock  
company, of which Richard Sugden will own a  
controlling interest.

The Bridgeport (Conn.) Board of Trade have  
tried for some time to induce Bell & Fuller,  
Holyoke, to move their asphalt pipe manufac-  
tory to that city, and they have at last decided  
to do it. A stock company has been organized  
under the name of the Asphalt Pipe Company,  
with a capital stock of \$50,000, \$10,000 of which  
is taken by Bridgeport parties. They will  
move their works April 1, having made a large  
contract to furnish gas and water pipes to  
Bridgeport, and a quantity of gas pipe in  
Northampton. They are also negotiating with  
the authorities of Battle Creek, Mich., about  
furnishing pipe for that city.

The Commercial Bulletin of the 26th says:  
The Knowles Pump Works, Warren, shipped  
the latter part of last week another of their  
large steam pumps for the Chicago water  
works. The pump has a capacity of raising  
three million gallons of water a distance of  
one hundred and fifty feet per day. The weight  
of the pump shipped is nineteen thousand  
pounds. Another of their pumps has just  
been sent to Liverpool, England.

The Wason Car Company, at Brightwood,  
made 16 cars in January, and will probably finish  
as many more this month. They are em-  
ploying from 300 to 400 workmen, and have  
orders for several months ahead.

### NEW YORK.

On the 29th the failure of Avery & Riggins  
was reported, manufacturers of steam heaters  
and ventilators, at No. 431 East Tenth street  
and No. 3 Broad street.

### NEW JERSEY.

The total liabilities of the Phoenix Manu-  
facturing Company, of Paterson, N. J., are fixed  
at \$307,000. In addition to this, there is a  
mortgage of \$70,000 on the mill property.

### PENNSYLVANIA.

The Mount Hope Furnace, C. B. Grubb & Co.,  
Lancaster county, will blow out early in the  
spring, for rebuilding the hearth and putting  
in one of Weimer's hot blasts. The furnace is  
one of the oldest in that section of the State,  
and is still using charcoal. In former years  
the weekly production was from 25 to 28 tons  
of No. 1 iron, but of late it produces 42 tons  
per week. In construction it is small, requires  
but one filler, one keeper and one gutter man  
on turn at a time.

The Weimer Machine Company have a con-  
tract for a number of cars for a New Jersey  
Railroad.

The Penn Steel Co., at Harrisburg, are the  
only Bessemer works in the country that  
hammer their ingots, but we understand they  
have ordered a blooming mill, which is about  
half done.

A brief report of the Reading industries is as  
follows: The tube and pipe works of Seyfert,  
McManus & Co. are running at present with  
about fifty men. A large pile of pipes have  
been finished ready for shipment. The fur-  
naces of Eckert & Bro., and Seyfert, McManus  
& Co., are still idle. Some shipments of pig  
iron were recently made. Seyfert, McManus &  
Co.'s steam forge, on North Eighth street, is in  
full operation, with some thirty men. Orders  
are said to have been received for large shaft-  
ing, cross-heads and other heavy work.

The Vindicator says it is expected and con-  
fidently believed that the rolling mill at Hub-  
bard will start up about the middle of March.  
The mill has been idle about two years, and  
when in operation gives employment to about  
one hundred hands.

Workmen have begun repairing the Shenan-  
go furnaces, at West Middlesex, and the Fan-  
line is also having a new lining made. At pre-  
sent neither of the four blast furnaces in this  
place are in blast.

The workmen at the Connellsville Locomo-  
tive Works are now working nine hours a day  
instead of eight, as they have been doing all  
winter.

We hear of a sale of coke at two cents, in  
open cars. The contract has been taken as a  
standing order for some time ahead. Another  
sale we heard of was at 1 1/2 cents. We hope  
that the latter operator has a long contract, and  
that his men will strike on him at once, as he  
deserves to lose all he has. Coke can be sold  
at such prices only at the expense of the work-  
men, and we hope it will result in the ruin of  
the operator.—Connellsville Tribune.

The Coalbrookdale Iron Works, Douglass  
township, Berks county, are running regularly,  
and make a daily average of six tons of iron,  
&c.

A new furnace was blown in at Cooper &  
Hewitt's Durham Iron Works, at Riegelsville,  
last week.

The Red Bank Furnace, of Reynolds & Moor-  
head, is making about 30 tons of cold short iron  
per day. It is the intention of the proprietors  
to blow this furnace out as soon as stock on  
hand is used.

The Robesonia Furnace, at Robesonia, pro-  
duces between 150 and 160 tons weekly, varying  
a few tons one way or the other weekly.

The Chenango Valley Argus says: Messrs.  
Hamblin, Sons & Co., are now engaged in get-  
ting out a number of castings for new furnaces  
for the Greenville Iron Co. They have also  
some orders for machinery from the South to  
fill. These gentlemen have recently completed  
their works, and are getting out a new style of  
stationary engine and boiler of small power.

### PITTSBURGH AND VICINITY.

The Panhandle miners have gone to work in  
the following pits at the reduced wages, 2 1/2  
cents per bushel: Mansfield, Negley's, Steen  
& Sons', Fort Pitt, Huntsman, Miller & Co.'s,  
Oak Ridge, Miller Grove, Pittsburgh National,  
Laurel Hill, Briler Hill, Pittmore, Walnut Hill  
and Midway.

The boring for gas on Boyd's Hill still contin-  
ues night and day, at the rate of 40 feet every  
24 hours.

The gas fuel experiment in the manufacture

of flint glass, which has been in progress for  
some time past at Adams & Co.'s works on  
Tenth street, South Side, is likely to prove a  
complete success. The furnace has been heated  
to the highest standard, and the heating of the  
pots has been fully accomplished, and all that  
remains now is to melt the glass, which is now  
being done. The last test in the whole experi-  
ment will be made on Monday next. John  
Adams, Esq., the senior member of the firm,  
and president of the Western Flint and Lime  
Glass Association, is giving the expert his  
personal supervision.

The Inventors' Protective and Benevolent  
Association has secured a large space in the  
main building of the Centennial Exposition,  
for the exhibition of models of American in-  
ventions for its members.

As soon as the weather gets favorable the  
United States Commission for testing boilers  
will resume their long delayed experiments at  
Munhall's Farm.

The National Tube Works have begun the  
manufacture of 15 inch lap-welded tubes. They  
had heretofore made none larger than 14 inch.  
These tubes, it is claimed, are the largest ever  
made. This company have had in contempla-  
tion for some time the erection of a large roll-  
ing mill. They buy now all of their skelp iron,  
and since the removal of the entire tube busi-  
ness to McKeesport, this amounts to a consid-  
erable sum per year.

Messrs. Hussey, Wells & Co., in addition to  
running their 3 pair of Siemens furnaces—144  
pots—night and day, have been compelled to  
use their coke holes as well in order to supply  
the demand for their steel.

Messrs. Anderson & Woods are putting in a  
new 30 inch mill for rolling sheets and plow  
steel.

Lewis Oliver & Phillips have just put in  
an additional reheating furnace at their Alle-  
gheny Mill.

At the United States Iron and Tin Plate  
Works a machine is in operation, the invention  
of Mr. John B. Davis, intended to do away with  
cold rolling, pickling and annealing or softening.  
It has 5 pair of rolls, 3 pair of 3 inch  
diameter and 2 pair of 12 inch diameter. The  
small rolls are steel, and the large ones are  
covered with a good thickness of emery. The  
plate is passed through, and the emery rolls  
polish and finish the plate. The small rolls  
only act as conductors. Two boys can run the  
machine.

A meeting has been called to meet at  
McKeesport, March 6, to agree on a general re-  
striction of labor in mines.

Porter, Bell & Co. have just received an order  
for a light locomotive for the Boston and Lynn  
Railroad. They are now running 8 hours, but  
expect to increase to 10 next week. This  
makes 7 orders received lately.

### MARYLAND.

The following notice was posted at the roll-  
ing mills of the Baltimore and Ohio Rail-  
road Company, in Cumberland, on Tuesday:  
"Notice to Fuddlers and Puddlers' Heaters,  
February 22, 1876.—The price submitted for  
puddling for rail mill is three dollars  
and fifty cents per ton of 2340 pounds. The  
helper to get one-third, and nothing allowed  
per heat from the office."

### WEST VIRGINIA.

The stockholders of the Clifton Mill are hold-  
ing meetings to decide on what they shall do  
with their mill.

There is a strike at Mountsville. The trouble  
is with the rollers.

The Benwood Nail Factory resumed opera-  
tions Monday.

### OHIO.

There are 57 furnaces within an average dis-  
tance of 25 miles of Portsmouth.

The Pomeroy Mill is running.

The Ohio City Mill, at Martin's Ferry, is hav-  
ing trouble with its men from having paid them  
in due bills instead of cash.

The Forest City Spring Works are turning  
out about ten and a half tons per day.

The Lake Erie Iron Company, Cleveland,  
manufactured 6566 tons of iron in 1875, run-  
ning their mill 315 days during that period;  
14,394 tons of coal were required, and the ag-  
gregate amount paid for labor during the year  
was \$70,684 34. The production for the pre-  
vious year was 5992 tons of manufactured iron.

The Ironton Journal says: Buckhorn Fur-  
nace was put in blast last week and will run  
entirely on native stone coal and native ore.  
The owners have already mined a large quan-  
tity of coal for that purpose and will continue  
to do so. There is certainly plenty of coal of  
a quality to make good foundry iron near Buck-  
horn and Clinton furnaces.

Fairfield Furnace, Canal Dover, is in blast.

The Ironton Journal says one corporation in  
that place has \$100,000 worth of pig iron on  
hand, and has sold large quantities lately.

The iron and steel mill at Ironton has shut  
down for the present. Last Tuesday all the  
warehouse men and clerks were discharged, ex-  
cept one or two, until further notice.

Lawrence Furnace, which is a charcoal one  
run on coal, will go out of blast next month to  
put in a fire brick bottom.

Alice Furnace (Etna) made 410 tons of metal  
last week, and was 12 hours off during the time.  
The furnace used one-quarter Iron Mountain  
to three-quarters native ore. This is the fur-  
nace on the Ferrie plan so fully described in  
our issue of the 3d of February.

### MICHIGAN.

The Kimball & Austin Manufacturing Co.,  
of Kalamazoo, have been doing a good busi-  
ness during the past year. Their specialties  
are engines, boilers, saw mills, road working  
machinery and machinists' tools. They man-  
ufacture a full line of agricultural implements,  
steel mold plows being a specialty. They em-  
ploy at the present time 80 men. They have  
just been awarded a contract for building an  
engine 20x35, two steel boilers 4x14 and some  
other machinery for the Eagle Portland Ce-  
ment Co., of Kalamazoo, amounting in all to  
some \$8000. They are also building a circular  
saw mill to go to Sutton's Bay.

### TENNESSEE.

Mr. Denis Scofield, late of the Atlantic Roll-  
ing Mill, yesterday completed the purchase of  
a site for his merchant rolling mill. The lot is  
280x280, and is bounded by Whiteside, Sidney,  
Lousa and Catherine streets, and is known as  
the James residence. The price paid for the  
land and buildings was \$7500. Mr. Scofield  
will at once proceed to erect buildings and  
place the necessary machinery for the manufac-  
ture of merchant bar iron, cotton ties, &c.—  
Chattanooga Commercial, Feb. 24.

### INDIANA.

The Plate Glass Works, at New Albany, are  
running night and day.

### KENTUCKY.

The Louisville mills are running.  
Redfield, Bowen & Co., iron merchants and  
manufacturers, of Chicago, have recently  
opened and set in operation at Louisville an es-  
tablishment for the purpose of making iron  
castings, such as hollow ware, sash weights,  
air grates, etc. This firm has obtained posses-  
sion of the works recently occupied by the  
Louisville Steel Works.

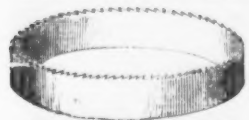
The Norton Iron Works, Ashland, shipped  
last week to different points 4300 kegs of nails.  
The furnace is now using one-third coke and  
two thirds raw coal. All departments are run-  
ning on full time, and the forge department on  
double time.



**GEORGE GUEUTAL & SON,**

39 West 4th St., New York.

IMPORTER OF



Wood Screws, Steel in Sheets,

BAND SAWS, TOOLS FOR BRAZING, &amp;c.

Bed Screws, Pin Hinges, and Wire Nails a Specialty.

HARVEY W. PEACE.

JOHN HOGAN.

**PEACE & HOGAN,**

MANUFACTURERS OF EVERY KIND OF

**Patent Ground Saws,**

CIRCULARS, CROSS-CUTS, MILL, MULAY, GANG, HAND, &amp; BUTCHER.

Molding and Planing Knives, Plastering Trowels, Mitering Rods, &amp;c.

FACTORIES:

Union Avenue, Tenth &amp; Ainslie Sts., BROOKLYN, E. D., N. Y.

**THE SILVER STEEL  
DIAMOND CROSS-CUT SAW.**

\$1.50 Per Foot. Patent Secured

THIS new Saw, which is destined to take the place of all Cross-cut Saws in point of **SPEED AND EASE**, is manufactured by **E. C. ATKINS & CO.**, Indianapolis, Ind., who are the **SOLE MANUFACTURERS FOR THE UNITED STATES.** So confident are we that this is the best Cross-cut Saw in the market that we **CHALLENGE THE WORLD.** Orders promptly filled.

E. C. ATKINS. H. KNIPFENBERG. Saw Manufacturers and Repairers, Indianapolis, Ind.

**Curry Comb Mfg. Co**

OFFICE,  
Northeast corner High & Friend Sts.,  
**COLUMBUS, OHIO.**

Our Combs are made with extra heavy Trowel Shanks, every Comb **WARRANTED.** They are not full jeweled, do not infringe upon the rights of any of those manufacturers of new fangled ideas, more beautiful in theory than in practice, but we do present a common sense Curry Comb that every hostler in the country can use successfully, without undergoing a course of instruction as to the grasping device, &c., &c. These Combs are made both open and close back.

**JOHN C. JEWETT & SONS'**

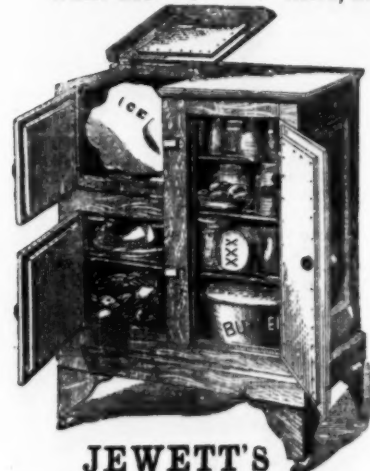
ESTABLISHED IN 1849.

BUFFALO, N. Y.

MANUFACTURERS OF

Also **JAPANNED & BRIGHT BRASS BIRD CAGES,**

Water Coolers, Water Filters, Bathing Apparatus, Tea Trays, &amp;c., &amp;c.

**JEWETT'S  
Buffalo Refrigerators.**

Send for copy of our Splendid Centennial Catalogue.

**Jewett's Patent  
Filter**  
WITH  
**PORCELAIN  
LINED  
COOLER.**

Acknowledged the only Complete Filter and Cooler in the world.

Hardware, House-furnishing and Crockery dealers and no more salable article, as this Filter is perfect in its work of purifying water of every kind, attractive in appearance, &amp;c., &amp;c.

Manufactured only by  
**JOHN C. JEWETT & SONS,**  
Buffalo, New York.**Wheeler, Madden & Clemson****MFG. CO.,**

MIDDLETOWN, - - - NEW YORK.

Manufacturers of

**WARRANTED CAST STEEL****SAWS**

Of every description, including

Circular, Shingle, Cross-Cut, Mill, Hand,  
**WOOD SAWS, Etc., Etc.****AMERICAN SAW CO.,**

Manufacturers of

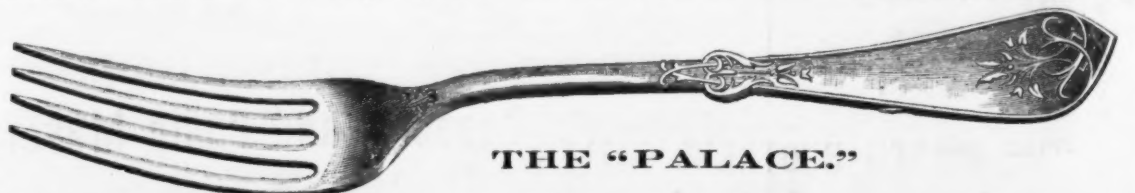
Movable Toothed Circular Saws,  
**PERFORATED CROSS-CUT SAWS**  
And **SOLID SAWS** of all kinds. Trenton, N. J.**GREENFIELD TOOL CO.,**

Greenfield, Mass.

Sole Manufacturers of the Celebrated

**"Diamond" PLANE IRONS,****EXTRA PLATED TABLE CUTLERY. PATENT FORGED OX SHOES.** The only Shoe made with concavity to fit hoof. **BENCH AND MOULDING PLANES** of every description, &c., &c. Drop Forgings to order. Address for Catalogue with stamp.**HALL, ELTON & CO.,**

Electro Plated Ware, German Silver and Britannia Spoons.



THE "PALACE."

Factories, Wallingford, Conn.

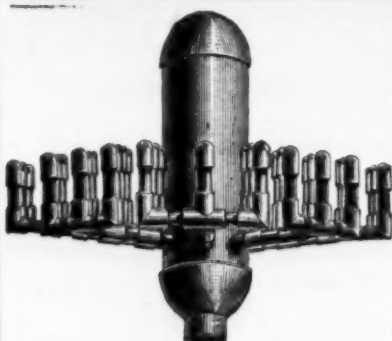
Salesroom, 75 Chambers Street, New York.

**HISCOX FILE MANUFACTURING CO.**

WEST CHELMSFORD, MASS.

**FILES & RASPS**

OF EVERY DESCRIPTION, ALSO ALL KINDS OF

MACHINE ——— RAG  
MOULDING ——— STRAW  
VENEERING ——— PAPER OR  
LOG WOOD ——— TRIMMING**KNIVES**ADDRESS **HISCOX FILE MANUFACTURING CO**  
WEST CHELMSFORD, MASS.**STEELE'S PATENT STEAM JET**For creating forced draft in Boiler Furnaces, Marine, Stationary or Locomotive. These Jets put in under the following stipulations: 30 days' trial given—if not satisfactory no charge or low suits. Steamship, steamboat and factory smoke stacks warranted to draw 75 per cent. better. For further particulars apply to  
**GEO. STEELE,**  
4 Third Ave., bet. 139th & 140th Sts., N. Y.  
Or to **McNAB & HARLIN MFG. CO.,**  
56 John Street, N. Y.**THE HULL & BELDEN CO.,**  
DANBURY, CONN.

Wrought Iron &amp; Steel

**Drop Forgings,**

FINE AND CLOSE WORK FOR

Guns, Pistols, Sewing Machines and other fine Tools and Machines, Wrenches,

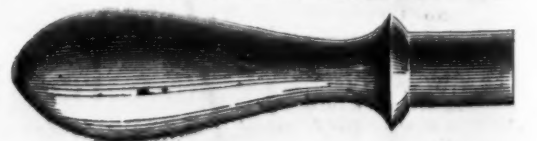
CLAMP &amp; THUMB SCREWS, CARRIAGE IRONS, AGRICULTURAL &amp; OTHER IMPLEMENTS, &amp;c., &amp;c., at reasonable prices.

IN STOCK.

**Machine Handles,**

(SEVEN SIZES)

Both Finished &amp; Rough.

**VAN WART, SON & CO.**

Hardware Commission Merchants.

EXPORTERS AND IMPORTERS,  
BIRMINGHAM, - ENGLAND.

Agents.

**VAN WART & McCOY,**

134 &amp; 136 Duane Street, N. Y.

**George H. Gray & Danforth,**

48 India Street, Boston.

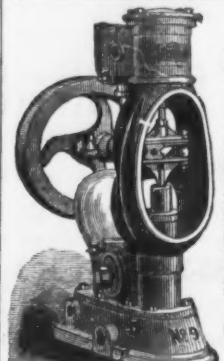
**F. W. TILTON,**

17 Old Levee Street, New Orleans.

At each of these places a complete assortment of samples of Hardware and Fancy Goods will be found, including all new descriptions. Sole Agents for  
**John Rimmer & Son's Celebrated**  
Harness and other Needles.**W. Clark's Genuine Horse Clippers,**  
**Seydel's "Ashantee" Pocket Hammer****OSCAR IRVING VAN WART & Co.,**

FORWARDING AGENTS.

2 South John Street, LIVERPOOL.

WASHINGTON, D. C.,  
Sept. 13, 1875.**JNO. MAYER,**  
Treas. Valley Machine  
Co., East Hampton,  
Mass.DEAR SIR: The  
"Wright Rocket Plunger  
Steam Pump" you  
built for the Govern-  
ment "works like a  
top." Am sure it has  
never had its equal in  
any of the departments,  
and I have no hesitancy  
in recommending this  
Pump to any one in  
want of a first-class,  
noiseless Steam Pump.  
Very respectfully,  
**J. THOS. MILLER,**  
Chief Engineer U. S.  
House of Representatives.

Send us for Catalogue.

**Valley Machine Co.**



## Cutlery.



NORTHAMPTON CUTLERY CO.,

Manufacturers of all kinds

American Table Cutlery,

Ivory-Plated, Cook, Butcher, Shoe and Hunting Knives.

THEODORE WEED, Manager, 45 Murray Street, N. Y.

FRIEDMANN &amp; LAUTERJUNG,

MANUFACTURERS OF

Pen and Pocket Cutlery, Solid Steel Scissors, F. &amp; L. Shears, Razors, Russia Leather Strops, Oil and Water Hones, &amp;c.

Sole Proprietors of the renowned full concaved patent

"ELECTRIC RAZORS."

Also Agents for the BENGALL RAZORS.

American Table Cutlery, Butcher Knives, &amp;c.

91 Chambers and 73 Reade Streets, NEW YORK.

423 N. Fifth Street, ST. LOUIS, MO.

TABLE KNIVES AND FORKS OF ALL KINDS,

AND ORIGINALLY EXCLUSIVE MAKERS OF



Also the exclusive makers of the "Patent Ivory" or Celluloid Knife, which is the most durable White Handle Knife known. These Handles never get loose. Always call for the "Trade Mark"

"MERIDEN CUTLERY COMPANY" on the blade.

Warranted and sold by all dealers in Cutlery, and by the MERIDEN CUTLERY CO., 49 Chambers St., N. Y.

THE MILLER BROTHERS CUTLERY CO.,

Manufacturers of

PATENT FINE PEN &amp; POCKET CUTLERY

WEST MERIDEN, CONN.

The only Knives made that are put together in such a manner that there is no strain on the covering or frail part of the knife. We warrant our knives equal in cutting qualities and workmanship to any made, and are acknowledged by English makers as the Best American Knife. We also make

NICKEL &amp; SILVER PLATED POCKET KNIVES

which will not rust or become discolored when used as a Fruit Knife, and their cutting qualities are equal to any other knife. Orders filled from the factory, and in New York by Messrs. J. Clark Wilson &amp; Co., No. 81 Beekman Street (who have a full stock of all patterns always on hand), and also by Messrs. G. B. Walbridge &amp; Co., No. 99 Chambers Street.

Naugatuck Cutlery Co.,

Manufacturers of FINE

PEN and POCKET CUTLERY.

FULLER BROTHERS, Sole Agents,

89 Chambers and 71 Reade Sts., N. Y.

JOSEPH RYALS, Collinsville, Conn.,

Manufacturer of Patent



Made by a new process RECENTLY PATENTED which enables me to produce goods that in quality, finish and general excellence surpass any. All warranted Solid Cast Steel Blades.

ROGERS &amp; BRO.,

MANUFACTURERS OF THE

Celebrated Silver Plated Goods, FORKS, SPOONS, HOLLOWWARE, &amp;c.,

STAMPED

"ROGERS &amp; BRO. A 1,"

which they are now offering at greatly reduced prices.

Price Lists and Discounts mailed on receipt of business card or reference. Address,

P. O. Box 320.

203 Broadway, New York.

ESTABLISHED 1852.

NEW YORK KNIFE CO.

MANUFACTURERS OF SUPERIOR

Table &amp; Pocket Cutlery,

WARRANTED TO BE MADE OF THE BEST MATERIAL.

WALKILL RIVER WORKS, Walden, Orange Co., New York. THOS. J. BRADLEY, President.



KANN &amp; SONS MFG. CO. Manufacturers of Albina &amp; Britannia TEA and TABLE SPOONS, Castor Frames, Ladles, &amp;c. 84, 86 &amp; 88 N. Holliday St., Baltimore, Md.

X. L. C. R.

X. L. C. R.

EMANUEL MARX,

IMPORTER OF

Table &amp; Pocket Cutlery,

Solid Steel Shears, Britannia Spoons, Britannia Soap Ladles and Toy Castors.

OFFICE &amp; WAREHOUSES, 106 Chambers Street, near Church, New York. Sent for Price List.

AMERICAN

PEN AND POCKET KNIVES,

MANUFACTURED BY

PEPPERELL,

Aron Burkinshaw, MASSACHUSETTS

My Blades are forged from the best Cast Steel, and warranted. To me was awarded the GOLD MEDAL of the Connecticut State Agricultural Society, also a 1st and 2nd Diploma from the Mass Mechanics' Ass'n Sept., 1874.

FURNESS, BANNISTER &amp; CO.

Manufacturers of

Fine Table CUTLERY.

Cor. Nassau &amp; Sheffield Sts.,

NEWARK, N. J.

## Cutlery.



JOSEPH S. FISHER,

No. 411 Commerce St., PHILADELPHIA

AGENT FOR

George Wostenholm &amp; Son,

"Limited."

Washington Works, SHEFFIELD,

Celebrated I-XL Cutlery, Razors, &amp;c

AGENT FOR

WALTER SPENCER &amp; CO.,

Steel and File Manufacturers,

Rotherham, ENGLAND.

Corporate Mark.

NO SPENCER ROTHERHAM

Granted 1777.

F. W. HARROLD,

Birmingham and Sheffield, ENGLAND.

Importer on Commission

OF HARDWARE, CUTLERY, GUNS, &amp;c.

W. SANDERS, Agent,

78 Chambers Street, N. Y.

CORPORATE MARK,



Joseph Rodgers &amp; Sons' (LIMITED)

CELEBRATED CUTLERY,

No. 82 Chambers Street, New York.

F. &amp; W. CLATWORTHY, Agents.

The demand for Joseph Rodgers &amp; Sons' productions having considerably increased, they have, in order to meet it, greatly extended their Manufacturing Premises and Steam works. To distinguish Articles of Joseph Rodgers &amp; Sons' Manufacture, please to see that they bear their Corporate Mark.

ASLINE WARD,

101 and 103 Duane Street, N. Y.

REPRESENTING

GEO. WOSTENHOLM &amp; SON,

"LIMITED."

CUTLERY AND RAZORS,

Washington Works, Sheffield.

CORPORATE MARK.



FREDERICK WARD &amp; CO., Sheffield,

Cutlery and Table Knives.

CORPORATE MARK.



Young's Patent Folding Scissors.



Fac simile of the small size.

These Scissors are made of the very best steel, nickel plated, and so constructed that they can be readily folded and carried in the pocket without injury to the garments. A sample pair will be sent by mail, to the trade only, upon receipt of the retail price, namely: For small size, either blunt or pointed.....\$1.00 Large size, pointed or half pointed.....\$1.50 New York, Feb. 1st, 1874.

MARX BROS., Proprietors, 430 Broadway.

GRAEF &amp; NEVINS,

IMPORTERS OF

German Hardware

and CUTLERY,

No. 104 Duane Street, NEW YORK.

Having associated ourselves together for the purpose of carrying on an importation business of German Hardware and Cutlery, would call attention to our entire new line of goods from the celebrated factories of Jacob Banger Sohn, Harmer, and are prepared to execute promptly all orders placed in our hands. Respectfully yours, &amp;c.

Sole Agents Jacob Banger Sohn.

H. A. ROGERS,

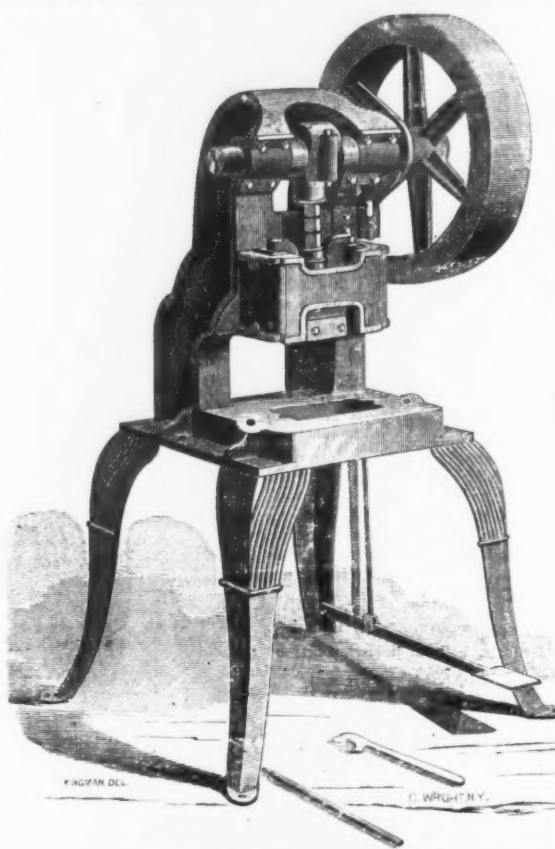
BOX 4106.

19 John Street, NEW YORK.

SUPPLIES, in every variety,

For Railroads, Mills and Manufacturers.

Send for new Illustrated Catalogue, 272 pages.



BLISS &amp; WILLIAMS,

Manufacturers of all kinds of

PRESSES, DIES, &amp; SPECIAL MACHINES.

FOR WORKING SHEET METALS, &amp;c.

167 to 173 Plymouth Street, Cor. of Jay, Brooklyn, N. Y.

THE NATIONAL ICE SHAVER.



Saves Ice, saves Labor. Made of Cast Steel thoroughly tempered. Manufactured by

MALTBY, CURTISS &amp; CO., 34 Reade St., N. Y.

Send for Price List.

Also Manufacturers of

CAPEWELL'S GIANT NAIL PULLER, THE NOVELTY ICE BREAKER, ROSE WOOD, MAPLE AND METAL KEY FAUCETS.

IRON BLOCK PLANE.

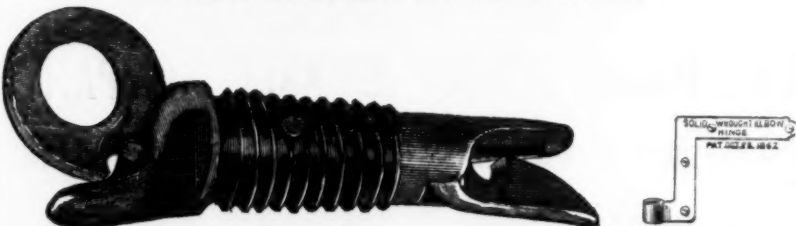
No. 110. 7 1-2 Inches Long, 1 3-4 Inch Cutter, \$9.00 per dozen.



STANLEY RULE AND LEVEL COMPANY, Manufacturers, Factories, New Britain, Conn. Warehouses, 35 Chambers St., N. Y.

B. D. WASHBURN &amp; CO.,

35 and 37 Batterymarch Street, BOSTON, MASS.



Manufacturers of every variety of

Blind Trimmings, Glaziers' Points, &amp;c. &amp;c

We offer from Stock and Contracts at generally reduced prices:

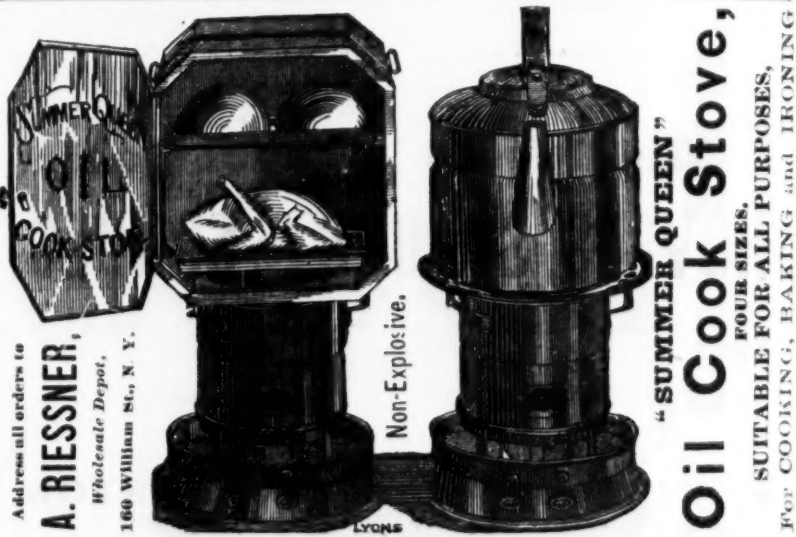
35,000 doz. Window Pullies.

30,000 lbs. Machine Finishing Nails.

20,000 lbs. Boardmen's Barbed Staples.

500 doz. Sash Cord.

Full stock of Foreign and Domestic Glue, Sand Paper, Emery Wheels, Emery Grinders, Washington Mills Emery, American Window Glass, etc., etc.



A. RIESSNER,

Wholesale Depot, 160 William St., N. Y.

Non-Explosive.

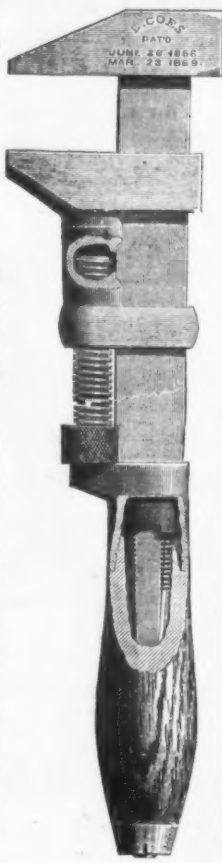
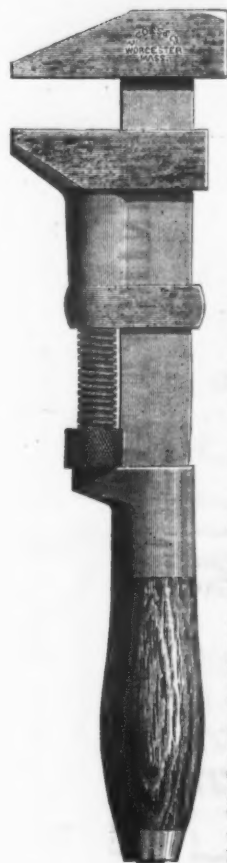
"SUMMER QUEEN" Oil Cook Stove, FOUR SIZES, SUITABLE FOR ALL PURPOSES, FOR COOKING, BAKING and IRONING.



# L. COES' SCREW WRENCHES.

Genuine Improved Patent

Manufactured by

L. COES & CO.,  
Worcester, Mass.

We invite the particular attention of the trade to our New Straight Bar Wrench, widened, full size of the larger part of the so called "reinforced or jog bar." Also our enlarged jaw, made with ribs on the inside, having a full bearing on the front of bar (see sectional view), making the jaw fully equal to any strain the bar may be subjected to.

These recent improvements in combination with the nut inside the ferrule firmly screwed up flush, against square, solid bearings (that cannot be forced out of place by use), verifies our claim that we are manufacturing the strongest Wrench in the market.

We would also call attention to the fact, that in 1869 we made several important improvements (secured by patents), on the old wrench previously manufactured by L. & A. G. Coes which were at once closely imitated and sold as the Genuine Wrench by certain parties who seem to rely upon our improvements to keep up their reputation as manufacturers, and although the fact of their imitating our goods may be good evidence that we manufacture a superior Wrench, we wish the trade may not be deceived on the question of originality. Trusting the trade will fully appreciate our recent efforts, both in improvements on the Wrench and in the adoption of a Trade Mark, we would caution them against imitations. None genuine unless stamped

"L. COES &amp; CO."

Warehouse, 97 Chambers St., & 81 Reade Sts., N. Y.  
HORACE DURRIE & CO., Sole Agents.

M. H. Jones.

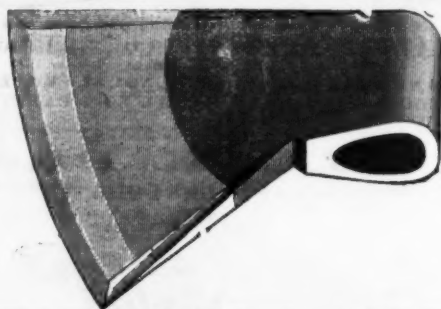
A. C. Peck.

M. H. JONES &amp; CO.

COHOES, Albany Co., N. Y.

Manufacturers of AXES AND EDGE TOOLS.

All Goods Stamped and Labeled  
M. H. JONES & CO.  
unless otherwise ordered.



Sole right to the use of the  
TEN EYCK AXE MFG. CO.'S  
Trade Mark.

HORACE DURRIE &amp; CO., Agents, 97 Chambers and 81 Reade Streets, N. Y.

**TURNED MACHINE SCREWS.**  
One-sixteenth to five-eighths diameter.  
Heads and points to sample.  
IRON, STEEL AND BRASS.  
Lyon & Fellows Mfg. Co.,  
Cor. 1st and North 3d Streets, Williamsburgh, N. Y.

THE ORIGINAL  
TOMLINSON SPRING & AXLE COMPANY,  
ESTABLISHED 1852.

Manufacturers of FIRST CLASS SPRINGS AND AXLES. Also, THE  
GROOT'S PATENT CROSS SPRING.

RUSSELL TOMLINSON, Pres.  
S. R. TOMLINSON, Secy and Treas.  
C. S. LUTTON, Supt.

BRIDGEPORT, CONN.  
All orders promptly executed.  
We have no branch. Please send your orders direct.

CONCORD AXLES

Will Run Easier, carry a Larger Load, and Wear Longer than any other Axle in the Market.  
All GENUINE Concord Axles are stamped with above trade mark. Manufactured only by  
D. ARTHUR BROWN & CO. Fisherville Concord N. H.

GEORGE T. RICHARDSON.

FRANK H. SCUDDER.

Middleboro' Shovel Co.

MANUFACTURERS OF

SHOVELS, SCOOPS &amp; SPADES.



Office and Salesroom,  
63 OLIVER STREET,  
Works Middleboro, Mass. BOSTON.

J. CLARK WILSON &amp; CO., New York Agents, 81 Beekman Street.

## Philadelphia Star Bolt Works.

"STAR"

Carriage and Tire Bolts,

From the Best Brands

of

NORWAY IRON.



The Celebrated

"STAR" Axle Clip.

All Styles of

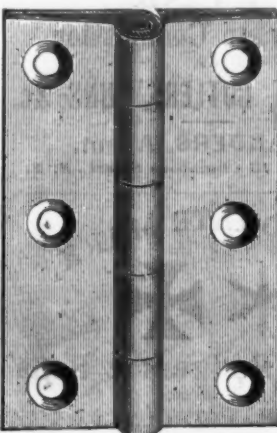
FANCY HEAD BOLTS.

Blank Bolts, Skein Bolts, Square Head  
Bolts, Plow Bolts, &c., &c., &c.

TOWNSEND, WILSON &amp; HUBBARD, 2301 Cherry St., Philadelphia, Pa

ESTABLISHED 1897.

H. M. WENTWORTH & CO.  
MANUFACTURERS OF  
Carriage Springs & Axles  
DAM, No 3 WATER ST., Gardiner, Me.  
ALL GOODS  
WARRANTED.



Cast Brass Butt Hinges,  
BRASS RIM AND MORTISE LOCKS,  
Ice House Hinges & Fastenings.

Manufactured and for sale by

W. &amp; J. TIEBOUT,

Manufacturers of

Brass, Galvanized and Ship Chandlery  
HARDWARE.

290 Pearl Street, New York.

## CARRIAGE BOLTS.

Buy the Best.

Clark's Patent  
Carriage Bolt.

Best Bolt manufactured for all kinds of agricultural machinery. Will not split the wood, and can not  
turn in its place.

MANUFACTURED BY

CLARK BROS. &amp; CO., Milldale, Conn.

Also Manufacturers of

Plow and Machine Bolts, Coach Screws, Nuts, Washers, Tire Blanks, Rivets, &c  
Send for Illustrated Price List.

## HOOPES & TOWNSEND,

Manufacturers of

MACHINE & CAR BOLTS,  
Cold Punched Square & Hexagon Nuts,

Washers, Rivets, Wood or Lag Screws, Chain Links, Truck and Car Forgings,

Bridge Bolts, Bridge Forgings.

IRONS AND RODS FOR BUILDINGS.

1330 Buttonwood Street.

PHILADELPHIA.

Bemis & Call Hardware & Tool Co.  
PATENT COMBINATION WRENCH.

These Wrenches are made from the best of Wrought Iron, with Steel Head and Jaw, Case-Hardened  
throughout, and not only combine all of the superior qualities of our cylinder or Gas Pipe Wrenches, but  
also all requisite Combinations of a regular Nut Wrench, thus making a Combination which has no equal.  
For Circulars and Price List, address,

BEMIS &amp; CALL HARDWARE &amp; TOOL CO. Springfield, Mass



The Old Reliable Pioneer Poke.

The only Poke made with an oil tempered Cast Steel Spring. Our Pokes  
are manufactured under the personal supervision of the proprietors themselves,  
from the very best selected Oak and Hickory Timber, and finished in  
the very finest style. We warrant our goods to be first-class in every respect.  
For further particulars and price please address

BISHOP &amp; BENEDICT, Berea, Ohio.

## SARGEANT MFG. CO.,

Manufacturers of

Saddlery Hardware

In Gold, Silver, Nickel, Japanned, Lined, & X C.  
Sole Manufacturers and Patentees of various Patented  
Improvements, including Gigs, Trees, &c. Imitation  
Covered Mountings, Wedge Buckles, &c. &c.  
75, 77 & 79 Summit St., NEWARK, N. J.

Clement &amp; Hawkes Mfg. Co.

Manufacturers of

SHOVELS,

Planters' Hoes, Trowels and Machinery.  
Northampton, Mass.

Send for Circular and Price List.



The Cheapest and Best Gauge Cook made.

Baltimore Bell &amp; Brass Works,

55 &amp; 55 Holliday Street, Baltimore, Md.

Manufacture all kinds of

Brass Work,

And keep on hand a full

supply of all

Goods used by Number,  
Steam and Gas Fitters.

C. DUREUX, Agent,  
Manufacturer of  
SCREWS,  
For any kind of work at prices  
lower than any furnished by his competitors.  
93 Elizabeth Street, New York.

W. C. BOONE,  
26, 28 and 30 Humboldt St., cor. Debevoise, Brooklyn, E.  
D. N. Y. Manufacturer of Standard  
TURNED MACHINE SCREWS.

Case-Hardened Set, Cap and Gibb Screws, Hexagon,  
Collar, and Drilled Head Screws, Agrarset and Nose  
Bolts, Special Screws, Rivets, &c. In  
order of Iron, Steel or Brass. Also Brass Knobs of all  
kinds made to order. Our Screws are made of the best  
Low Moor or Norway Iron, and are uniform in size.

The EUREKA "Perfected"  
SELF-ADJUSTING



Simplest, Best and Cheapest Clothes  
Wringer in the World.

Steel Elliptic Springs.  
T. J. ALEXANDER,  
General Agent and Manager,  
Office, Oliver St. cor. High, Boston, Mass.

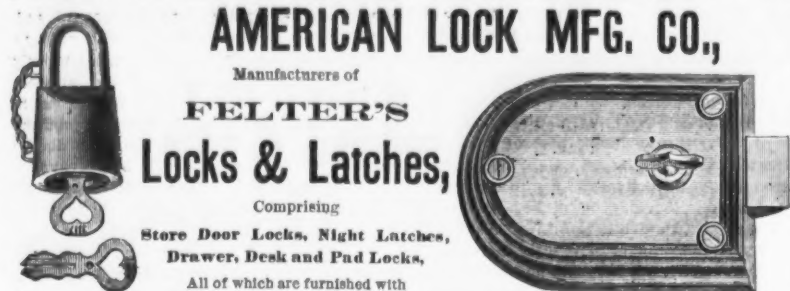
With Dutton's Saws.  
4  
SIZES.



Sold by Hardware Trade.  
LANGDON MITCHELL CO.,  
Send for Circular. Miami Falls, Mass.

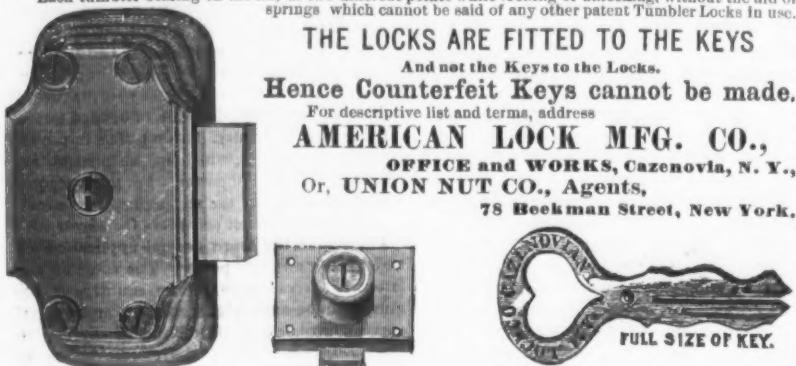


**AMERICAN LOCK MFG. CO.,**  
Manufacturers of  
**FELTER'S**  
**Locks & Latches,**  
Comprising  
Store Door Locks, Night Latches,  
Drawer, Desk and Pad Locks,  
All of which are furnished with

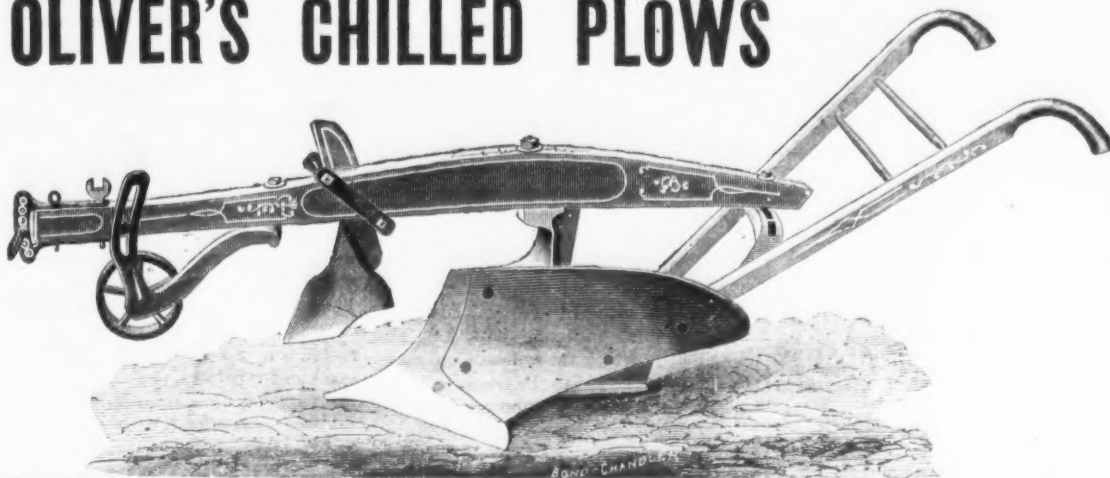


**SMALL, FLAT, AMERICAN STERLING METAL KEYS,**  
Which are stronger than steel, and cannot be affected by rust, and will remain bright and clear under all ordinary circumstances.  
A candid examination will convince the most unbelieving, that for simplicity, durability, convenience, and safety, they challenge comparison with any now before the public. Being made entirely by new and expensive machinery, especially constructed to manufacture them, they will rival the best made locks in finish and perfect operation.  
These Locks give perfect satisfaction, because they are the safest, cheapest and most durable Lock ever presented to the public, having thirty-five finely finished Brass Tumblers in each Door, and twenty-eight in each Drawer Lock, each one being finely false notched.  
Each tumbler bearing on the key at two different points while locking or unlocking, without the aid of springs which cannot be said of any other patent Tumbler Locks in use.

**THE LOCKS ARE FITTED TO THE KEYS**  
And not the Keys to the Locks.  
Hence Counterfeit Keys cannot be made.  
For descriptive list and terms, address  
**AMERICAN LOCK MFG. CO.,**  
OFFICE and WORKS, Cazenovia, N. Y.,  
Or, **UNION NUT CO., Agents,**  
78 Beekman Street, New York.



## OLIVER'S CHILLED PLOWS

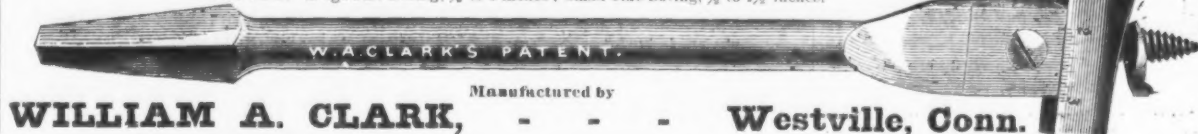


These implements, though but four years before the public in their present form, show the following remarkable record:  
1506 were sold in the season of 1871. 7172 were sold in the season of 1873. 31,077 were sold in the season of 1875.  
3049 " 1872. 14,976 " 1874.  
The sales for 1876, will undoubtedly exceed 60,000 Plows, one-third of that quantity being now on our order book. For full descriptive circulars, address  
**SOUTH BEND IRON WORKS, South Bend, Ind.**

## CLARK'S PATENT EXPANSIVE BITS

Made of JESSOP'S BEST CAST STEEL, and warranted superior to any other.  
Two sizes: Large Size Boring,  $\frac{1}{4}$  to 3 inches; Small Size Boring,  $\frac{1}{8}$  to  $1\frac{1}{2}$  inches.

**W. A. CLARK'S PATENT.**  
Manufactured by  
**WILLIAM A. CLARK,** - - - **Westville, Conn.**



## AMERICAN BOLT COMPANY,

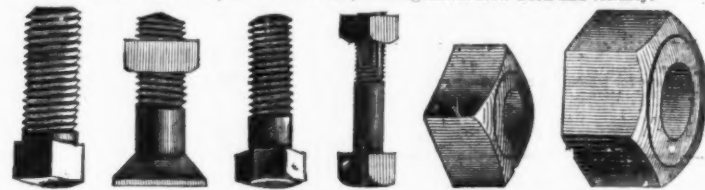
MANUFACTURE

### BOLTS AND NUTS,

Coach or Lag Screws, Washers, Chain Links, Forgings, &c.  
OF ALL KINDS AND SIZES, AT SHORT NOTICE.

**210 Lawrence St., Lowell, Mass.**

**JONATHAN HOPE.** **ROBERT H. BUTCHER.** **JAMES MINTER.**  
With increased facilities we are now enabled to pay prompt attention to all orders for our Patent Bolt Heading Machine, now fully acknowledged the best ever invented. Our Machines will head Bolts from  $\frac{1}{2}$  inch diameter to 1 $\frac{1}{2}$  inch diameter, and from  $\frac{1}{2}$  inch to 4 inches long, or longer if necessary, and almost any description of heads—square, hexagon, T head, &c. and properly attended, without changing, will head from 300 to 500 per day. We are also prepared to offer for sale our New Patent Bolt Cutter, which will cut Bolts from  $\frac{1}{2}$  inch diameter to 1 $\frac{1}{2}$  inch inclusive. A boy will cut on an average 400  $\frac{1}{2}$  inch Bolts per day. Parties wishing first class Bolt Heading Machines or Bolt Cutters, we would respectfully invite to call at our works, where they can at all times see the Machines in operation and judge for themselves. Perfect satisfaction guaranteed in all cases. For references and any other information in regard to the above, apply to the  
**American Bolt Co., Lowell, Mass.**  
**O. W. LEONARD, 40 John St.,** Sole Agent for New York and vicinity.



## WILSON BOHANNAN,

Manufacturer of Patent

### BRASS Pad Locks,

FOR

Railroad Switches,  
Freight Cars,  
AND THE HARDWARE TRADE.

All sizes, with Brass and Steel Keys, with and without chains.  
**PASSENGER CAR LOCKS,**  
Bronzed, Nickel-Plated and Japanned.  
**BROOKLYN, N. Y.**

Catalogues and Samples sent upon application.



## 11 Warren Street, N. Y.

**H. B. NEWHALL,**

Agent for the Following Companies:

## EMMET HAMMER CO.,

Manufacturers of all kinds of

**Hammers and Sledges and Contractors' Tools.**

**H. B. NEWHALL, Agent.**

All our goods are branded "E. F. EMMET & CO., Brooklyn, N. Y."  
None genuine without the above brand.

**MACHINIST** Ball, Straight and Cross Pene Hammers.  
**BLACKSMITH,** Hand and Riveting Hammers.

Chisels.  
**Sledges, Swages, Fallers, Flatteners, hot and cold**

**HORSE SHOERS'** Turning and Shoeing Hammers, Sledges, Pincers

**MINERS'** Striking and Drilling Hammers.

**QUARRY** Sledges, Macadamizing Hammers.

**MASON'S** Hammers, Brick Hammers.

**BOILERMAKERS'** Riveting and Flogging Hammers.

**COOPERS'** Hammers, Drivers and Stakes.

**RAILROAD and SHIP SPIKE** Mallets, &c., &c.

All kinds of

**ANVIL TOOLS and STEEL FORGINGS**

Made to order at short notice.



## WM. H. HASKELL & CO.

**Pawtucket, R. I.**

Manufacturers of

**COACH SCREWS (with Gimlet Point),**

all kinds of

**Machine and Plow Bolts,**

**FORGED SET SCREWS AND TAP BOLTS.**

**H. B. NEWHALL, Agent.**

## THE READING BOLT AND NUT WORKS.

**J. H. Sternbergh, Reading, Pa.**

Manufacturer of

**MACHINE BOLTS.**

Bridge,

Roof,

and

**Car Bolts.**

**Hot Pressed Nuts,**

Washers, Wood or Lag Screws, Refined Bar Iron, &c.

**H. B. NEWHALL, Agent, 11 Warren St., N. Y.**

**S. H. & E. Y. MOORE, Agents, 40 Lake St., Chicago, Ill.**

**POST & CO., Agents, Cincinnati, Ohio.**

## Penfield Block Works,

**LOCKPORT, NEW YORK.**



## Wrought Iron Blocks.

Patented Feb. 8, 1876

Have edges of Shells turned out and rounded to add to strength, and to protect rope from fraying. With iron Sheaves, steel roller bushed and polished grooves, and steel pins, they are the best in market.

**H. B. NEWHALL, Agent.**

## "DRAW CUT" BUTCHERS' MACHINES

Choppers, Hand and Power.  
Stuffers,  
Lard Presses.

Warranted thoroughly made and the Best in Use.

**MURRAY IRON WORKS**

**Hurlington, Iowa.**



## GEORGE FOCHT'S

**Iron Foundry, Machine & Sheet Iron Works.**

First and Adams Streets, Hoboken, N. J.

Inventor, Patentee and Manufacturer of the Celebrated Self-dumping Hoisting Tubs. Iron, Coal Cars, side or bottom dumping.

Iron Dock and Hook Blocks, Iron Sheaves, with or without Steel Friction Rollers for Chain, Wire or Hemo Rope, of every size and description. Iron for

Wheelbarrows, Coal and Coke Barrows, Charging Scoops, etc., for use Works, and Sheet Iron

Work in general. Improved Mast Shoe and Gaff Socket. Castings, and complete Iron Work for Mast and Gaff made to order and put up if desired. Machinery, Building and other

Castings on hand and made to order. Illustrated Circular and Price List sent on application.



## OHL & HAUSCHILD,

**Engineers & Machinists**

And manufacturers of

Lathes, Shapers, Slotters, Planers, Gear Cutters, Drill and Power Presses, Pulleys, Hangers and Shafting, Machinery and Machinists' Tools in general.

**57, 59 & 61 Nassau Avenue, Kearney (East Newark), N. J.**

# Nuts, Bolts, Washers, Etc.,

IN EVERY VARIETY.

Prices to suit the Times.

Send for Catalogue and Discount Sheet

TO

# UNION NUT COMPANY,

**78 Beekman Street, New York.**



# The Iron Age.

New York, Thursday, March 2, 1876.

DAVID WILLIAMS - Publisher and Proprietor.  
JAMES C. BAYLES - Editor.  
JOHN S. KING - Business Manager.

## RATES OF SUBSCRIPTION AND POSTAGE.

**Weekly Edition**.....\$4.50 a year.  
Issued every THURSDAY morning. Contains full Trade Reports for the week, brought up to the close of business on the previous day.

**Semi-Monthly Edition**.....\$2.30 a year.  
Issued the FIRST and THIRD THURSDAY of every month. Contains a full Review of the Trade for the previous half month.

**Monthly Edition**.....\$1.15 a year.  
Issued the FIRST THURSDAY of every month. Contains a full Review of the Trade for the previous month.

### To Foreign Countries.

	Weekly.	Semi-Monthly.	Monthly.
Canada.....	\$4.50	\$2.30	\$1.15
Cuba.....	5.00	2.50	1.25
Great Britain.....	5.00	2.50	1.25
France.....	5.00	2.50	1.25
Germany.....	5.00	2.50	1.25
Russia.....	5.00	2.50	1.25
Spain.....	5.00	2.50	1.25
Sweden.....	5.00	2.50	1.25
Switzerland.....	5.00	2.50	1.25
United States.....	5.00	2.50	1.25
West Indies.....	5.00	2.50	1.25
Yokohama.....	5.00	2.50	1.25

### ADVERTISING.

One square (12 lines, one inch), one insertion, \$2.50; one month, \$7.50; three months, \$19.00; six months, \$35.00; one year, \$60.00; payable in advance.

DAVID WILLIAMS, Publisher,  
10 Warren Street, New York.

### WESTERN OFFICE.

14 Fifth Avenue, Pittsburgh.  
JOS. D. WEEKS, Manager and Associate Editor.

### PHILADELPHIA OFFICE.

220 South Fourth Street.  
THOS. HOBSON, Manager.

### EUROPEAN AGENCY.

CHARLES CROSSLAND & Co., American Merchants, 28 Wilson Street, Finsbury, London, England, will receive subscriptions (all postage prepaid by us) at the following prices in sterling: Great Britain and France, 25/-; Germany, Russia and Belgium, 30/-; Sweden, 30/-; They will also accept orders for advertisements, for which they will give prices on application.

City subscribers will confer a favor upon the Publisher by reporting at this office any delinquency on the part of carriers in delivering the Iron Age, also, the loss of any papers for which the carriers are responsible. Our carriers are instructed to deliver papers only to persons authorized to receive them, and not to throw them in hall ways or upon stairs; and it is our desire and intention to enforce this rule in every instance.

### CONTENTS.

**First Page.**—Breaking Large Masses of Iron by Blasting with Dynamite. Jacob's Method for De-phosphorizing Iron Ores.  
**Third Page.**—The Stove Trade and its Evils. Construction of Lightning Protectors.  
**Fifth Page.**—New Patents. Screws in Castings.  
**Seventh Page.**—Gas Fixtures. A New Cause of the Breakage of Railroad Rails.  
**Ninth Page.**—Business Items.  
**Eleventh Page.**—What Can Manufacturers do to Reduce the Living Expenses of Workmen? The American Institute of Mining Engineers. Meeting of the American Institute of Mining Engineers.  
**Fifteenth Page.**—Meeting of the American Institute of Mining Engineers—(Continued). Much-Useful for Minerals, etc.  
**Twentieth Page.**—Hammond's Solid Steel Hammer. Philadelphia Correspondence.  
**Twenty-First Page.**—Trade Report.  
**Twenty-Second Page.**—Trade Report—(Continued). Our English Letter.  
**Twenty-Third Page.**—Our English Letter—(Continued). Through Trains from Boston to Washington.  
**Twenty-Seventh Page.**—The Iron Age Directory.  
**Thirtieth Page.**—New York Wholesale Prices of Hardware and Metals.  
**Thirty-First Page.**—New York Wholesale Prices (Continued).  
**Thirty-Fifth Page.**—Philadelphia, Buffalo, Cincinnati, Pittsburgh and Detroit Hardware and Metal Prices.  
**Thirty-Seventh Page.**—Chicago, Boston, and St. Louis Hardware and Metal Prices.

### What Can Manufacturers Do to Reduce the Living Expenses of Workmen?

We think it safe to assume that, while employers in this country are now bending every energy to reduce the cost of production, and to keep wages down to a point which will enable them to compete on terms of equality with foreign manufacturers for export, they are not indifferent to the well-being of their work people. Probably in no other country have the rights of labor to a fair and equitable share of the profits of production been so fully recognized as in the United States. Making all due allowance for purely selfish considerations on the part of those most immediately benefited by it, the fact remains that the taxation of imports under a protective tariff has for years received almost unanimous public approval, chiefly because it was a shield between the American workman and the necessity which, without protection, would have forced him to compete with the overworked and underpaid labor of Europe. This feeling has been shared in no small degree by the manufacturers, much as they have suffered from trade unions and the evils growing out of the attitude of active hostility which these organizations have maintained toward capital. A majority of the manufacturers with whom we have conversed during the past

few years, believe that labor should be well paid. "We do not want wages so low," say they, "that our men cannot live in comfortable houses, wear good clothes, have plenty to eat, educate their children, and accumulate something to live on when they are old. We want them contented and satisfied; we want them to save something every year, and, if possible, to become real estate owners and taxpayers." This, we think, is the way a great majority of employers, especially large employers, feel toward their work people. The bitterness growing out of the causeless, unwarrantable and long protracted strife which the unions have maintained, has often led to the adoption of defensive measures which have savored of harshness and severity; but the feeling of employers, as a class, toward workmen has been kindly, and during the past two years many of them have carried on business at a loss and made many great personal sacrifices, rather than close their works and throw their hands out of employment at a time when but little opportunity offered of obtaining work elsewhere.

Now, it has become evident that we have entered upon a period in which production, to be profitable, must be carried on so cheaply that our products can find a market abroad as well as at home. If we are to go on increasing and developing as a manufacturing nation, we must go out into the markets of the world and compete with Great Britain and Europe. To do this, we must maintain a high standard of quality in our manufactured goods, while putting them on the market at prices as low as those at which foreign manufactures are produced. This, of course, implies low wages—low, at least, as compared with the averages of the past ten to fifteen years; and while the general decline in values has increased the purchasing power of currency, it is probable that labor will not be as well off during the next ten years as during the ten years ended with the panic. Prices are so nearly down to a specie basis that we can tell with approximate accuracy what it will cost to live under given conditions for some time to come, and the manufacturer who has a genuine and sincere regard for the welfare of his workmen finds himself called upon to consider what he can do to promote their welfare. Considerations of self-interest, as well as motives of philanthropy, prompt him to this inquiry, and if he approaches it practically he will not be long, we think, in reaching practical conclusions.

In our judgment, the efforts which will be attended with the most satisfactory and encouraging results are those which seek to reduce the cost of living. The workman is not usually so situated that he can purchase anything to advantage. As a small consumer with a small supply of ready money, he must usually purchase at retail nearly everything he requires, paying therefore, prices which are enough greater than the wholesale prices of the same articles to represent three or four profits, with a liberal margin added to cover the risks and expenses of business. In manufacturing towns retailers have to give long credits, they lose a great deal in bad debts, and must charge high prices to make a profit at all. Now, why cannot the manufacturer act as agent for the workman, and buy whatever he needs? The system of storekeeping is a good one, but it has been greatly abused in many, and, perhaps, most instances. A store established in connection with a mill or factory should not be managed with a view to earning a profit, and it should not dispense on credit, even though the amount of the debts incurred by buyers can be settled at the pay table, and such debts are a lien against the buyer's accumulation of wages. Credits encourage extravagant expenditures, and settlements occasion discontent and dissatisfaction. The employer who keeps a store for the accommodation of his workmen should give no credits. He should pay his men their wages in full and exact cash for all he sells them. This would encourage economy, and prove more satisfactory, in the long run, than the system of charging purchases against the amount of wages due the workmen. A manufacturer having a few thousands of dollars available for employment in this way might supply his workmen with nearly everything they required at prices so low that a rate of wages lower than the average would content them, and his profit would be found in the lessened cost of his products. His storekeeper could act as agent for the purchase, at trade prices, of anything his men wanted, from a barrel of flour to a piano or a sewing machine, and thus save for the purchase of additional comforts and luxuries, or for investment in savings banks, from 15 to 25 percent., and perhaps more, of the proportion of a mechanics' wages which he can devote to the purchase of food, clothing, furniture, &c. It is probable that the men would object to the

cash system, and for a time prefer to continue dealing with those who would give long credits; but the thrifty and prudent would avail themselves of the opportunity of buying cheaply and keeping out of debt, and their example would soon be followed. Of course, those who do not want to buy on this plan can suit themselves in the matter.

Where manufacturers are so situated that they can do so, they can find profitable employment for a part of their surplus in providing houses for the workmen. These houses should be small, neat and convenient, built cheaply and well, and rented for just enough to cover interest, taxes and repairs. They should be under the direction of a competent sanitary inspector, empowered to enforce all rules and regulations needed to keep the premises wholesome and in good order. A model village of this kind is found in the portion of Cohoes, N. Y., owned by the Harmony Company, and tenanted by operatives in the Harmony Mills.

When practicable, the manufacturer may add to these advantages, gas, water and schools—grammar and industrial. We had intended to speak with some particularity on each of these subjects, but have already occupied so much space that we must leave them for fuller consideration in future articles. We regard this merely as an introduction of the subject, which is one of great and immediate interest to a very large class of our readers.

### The American Institute of Mining Engineers.

We present in another column the first installment of our report of the proceedings of the American Institute of Mining Engineers, at their meeting in Washington, last week. The paper of Prof. Henry, Secretary of the Smithsonian Institute, on motive power, will be found full of suggestions which merit the attention of the engineers. The paper of Mr. A. L. Holley, President of the Institute, of which we give a very full abstract, is considered by the members one of the most important and interesting yet presented at its meetings.

In connection with the discussion which followed, it presents the question of technical education in its practical relations to industry, and appeals to our manufacturers to extend more encouragement to the graduates of our technical schools, by extending to them fuller opportunities of learning to apply the knowledge they have gained in the schools. The paper possesses a peculiar and special interest for students of technology, as well as to those engaged in conducting our great productive industries, and we commend it to the attention of all classes of our readers.

The American Institute of Mining Engineers is now entering upon its fifth year, strong in membership, in influence and in the promise of a great and successful future. There was a time when we feared its usefulness would be impaired by the attempt to make it too comprehensive as regards the scope of its work, but it has had the advantage of good management from the first, and is now doing a work of national importance in giving us an American literature of metallurgy.

We are indebted to Mr. William Paulsen, of this city, for the following interesting statement of the production and importation of spelter in the United States in 1875, as compared with 1873:

	1873.	1875.
Tons.	Tons.	Tons.
Matthiessen & Hegeler Zinc Co., La Salle.....	3,500	3,500
Martindale Zinc Co., St. Louis.....	1,500	2,400
Illinois Zinc Co., Peru, Ill.....	900	1,518
Lehigh Zinc Co., Bethlehem, Pa.....	586	1,505
Missouri Zinc Co., St. Louis.....	1,400	1,500
La Salle Zinc Co., La Salle, Ill.....	1,004	1,389
Carondelet Zinc Co., St. Louis.....	537	530
Paschal Zinc Works.....	441	700
New Jersey Zinc Co.....	600	600
Chicago Zinc and Mining Co. (estimated).....	500	500
Bergen Port Zinc Co.....	331	331
Robert Lanyon & Co., La Salle, Ill.....	675	600
Production of scrap and dross in New York, Philadelphia & Boston, estimated at.....	7,343	15,833
Total.....	15,833	15,833
Importation of Silesian spelter in 1875.....	540	540
Stock January 1, 1875.....	135	135
Stock January 1, 1876.....	675	145
Thus deliveries for consumption in 1875.....	530	530
Average importation, p. a. since 1869.....	3,403	3,403

The following comparisons show the gold prices of common Silesian on Dec. 31st of each year since and including 1866:

	1866	1867	1868	1869	1870
New York gold, etc., 6%.....	14.10	13.12	13.6	13	11.19
Hann'g. Banco & Rm'y.....	1871	1873	1875	1874	1875
New York gold, etc., 6%.....	14.14	15.10	16.25	25	26
Hann'g. Banco & Rm'y.....	14.14	15.10	16.25	25	26

The following was the situation at the Pittsburgh rolling mills last week: Running double: Clinton, Clark's, Brown's, Lewis, Oliver & Phillip's Allegheny, Lindsay & McCutcheon, Millvale, Spang, Chalfant & Co.,

Carnegie, Shoenberger, in part; Moorhead, Chess, Smythe & Co., and Byers, McCullough & Co., lower mill. On single turn: Forge & Iron Co., Mullen & Malloney, Lewis, Oliver & Phillip's Birmingham mill, Sharpsbury, Fort Pitt, Dilworth, Porter & Co., Sligo, Zug and Lloyd. Byers' upper mill, part of Painter's, Whartons and Superior are idle. The conference between the boilers and manufacturers, at Pittsburgh, on Monday night last was fruitless of results, though it lasted from 1 p. m. to 2 a. m. The manufacturers, it is understood, demanded \$4.50 on a 2-c. card and the boilers \$4.75. A new proposition was submitted at the close of the conference, which the boilers are now considering.

### Meeting of the American Institute of Mining Engineers.

The last session of the fourth year of the American Institute of Mining Engineers opened at Washington Tuesday evening at 8 o'clock, p. m., a more than usually large number of members being present, the room of the secretary of the Smithsonian Institute, where it was held, being more than filled.

The meeting was opened by the president, Mr. A. L. Holley, who introduced the venerable secretary of the Smithsonian, Prof. Joseph Henry, who, after a very cordial address of welcome and a flattering recognition of the services of the Institute, read a very able paper on "Motive Powers," which is as follows:

The great difference between ancient and modern civilization consists, principally, in the vastly greater number of individuals who partake of the benefit of higher culture in the latter than in the former, and this difference is due to the fact that in ancient times the only energy employed in doing work for supplying man with the necessities or luxuries of life was that of muscular power, under a system of slavery which pervaded the world. All the architectural monuments of which the remains have come down to modern times, are the product of slave labor, directed by the favored few called freemen. In modern times man has become in a great degree relieved from brute labor, by substituting for his own muscular energy the power of nature, and this substitution is continually going on so that the number of persons required to perform mechanical labor is every year diminishing in proportion to the whole number of inhabitants in every civilized country.

As an example of the great change in this respect, I may incidentally refer to what is already known to you all, that it is estimated that 15 tons of anthracite coal equals the work of an able bodied man ten hours per day for 30 years, and that the labor of 3000 horses for ten weeks can be stored in the bunkers of an ordinary sea going steamer.

The powers which are now at the command of the engineer for doing work are those of wind, of water, of tide and of combustion. All these may be traced backward to the sun, with the exception of tide power, in which the action of the moon is predominant. In the present day, science gives no indication of the existence of any other motors. The announcements frequently made, and which startle the public, of the discovery of new motors are unworthy of the slightest consideration; they are generally the offspring of ignorance, and their authors, first deceiving themselves, finally attempt to deceive others. Commencing in folly the efforts of the inventors end in fraud.

It becomes a question of vast importance to the future whether the sources of power I have enumerated are inexhaustible. All analogy and the principles of science of the present day answer the question in the negative. The action of the moon on the waters may, it is true, be perpetual as long as the planets revolve in their orbits; the winds will exist while the sun gives diversity of heat on different portions of the earth, the water-power will diminish if the degradation of land goes on at its present rate, and even in the language of the poet:

"The sun himself shall fade and ancient night  
Again involve a desolate abyss."

These results, it may be said, are too remote to be within the pale of our sympathies, but this is not the case with regard to the power of coal. This is of definite extent on the surface of the globe, while the demand for it increases in a geometrical ratio with the time.

England, with sagacious foresight, has long been solicitous on this point, and, by careful surveys, is endeavoring to ascertain the limit of her national supremacy, which essentially depends upon the power of combustion for its continuance.

We hear much in our day of the great principle of the conservation of force, but comparatively little of the dissipation of energy. We should recollect that the doctrine of conservation of force applies to the universe as a whole, and not to our solar system as a part. From the latter an immense amount of energy is every moment being dissipated in space to be utilized, perhaps, in other systems, but not in our own. The sun is every moment giving out an immense amount of power, an infinitely small portion of which is caught by the planets, which revolve around it as a center.

In regard to the power of coal, though limited in quantity, it is used with reckless prodigality. Perhaps not more than three or four per cent. of that which is mined at any locality, is applied with useful effect; more than nine-tenths is wasted in the best form of our engines, and more than three-fourths is lost in the method of mining.

Surely this is a subject demanding the continued and scrutinizing attention of the engineer, since science holds out not the slightest prospect of the discovery of any other motive power comparable to this. I know the remark is frequently made that in view of the progress of the past, we cannot limit the discovery of the future. But this is an argument that ap-

plies to all anticipation, however absurd, and therefore, presents nothing on which we may rest with any degree of confidence. The only available power in the future, not yet utilized, is that of the heat of the interior of the earth, but this will require very deep mining, and the power when reached will not be immediately applicable to the use of locomotion, because it will demand methods of application very much different from those now employed for other motive powers.

The hopes which rest upon electricity as a motive power are entirely delusive. This is a power which specially tends to an equilibrium, and only exhibits energy when the equilibrium has been disturbed and is in process of restoration, and in the latter case it only yields the equivalent of the power which was expended in the former. In the present condition therefore of our knowledge, further progress in the arts of civilization depends essentially upon coal power, and after the supply of this begins to fail material progress can no longer be expected.

What lessons are we to draw from these facts? Evidently, First. That of improving our system of mining coal, so as to utilize every portion of uncombined carbon imbedded in the earth in a given locality. Second. The improvement of our engines, which are at present exceedingly wasteful of power. For this purpose, the improvement of the air engine, theoretically, offers the greatest prospects for success.

Thirdly. In the more general application of wind, water and tide power. The value of the latter, in several parts of the country, is beginning to be more highly prized, and special surveys have been instituted in some States, to ascertain actual amount of available power of this kind. Maine has done this very thoroughly, and New York has at present under way a survey for this purpose. Wind power, in many parts of the world, is much more generally applied than in this country, and tide power which, in such positions as that of the Bay of Fundy, might be used with greater advantage, is scarcely recognized by the engineer.

We might go on to speculate on the condition of humanity in the future, when our coal power shall have been exhausted, and the sun himself sends forth a diminished energy—but this would be a theme foreign to the considerations of the present. Craving your indulgence for occupying so much of your time, I beg to tender you my sincere regards and my best wishes for the continued success of your society.

### THE INADEQUATE UNION OF ENGINEERING, SCIENCE AND ART.

Mr. Holley began by stating that notwithstanding the enlarged application of scientific methods to the investigation of natural laws, and to the conduct of the useful arts, which are founded upon them, more notably in that system of arts of which engineering is the general name, still, neither the profession nor the craft of engineering may congratulate themselves too complacently, but should rather acknowledge to each other the embarrassing incompleteness of the union between engineering, science and art.

There is a small but most truly practical school of philosophers whom we may designate as original investigators. These do not, indeed, create the laws of nature, as they sometime almost seem to, but they go up into the trembling mountain and the thick darkness, and bring down the tables upon which they are written.

There is a larger class who may be designated as schoolmen—the scientific element of human progress, learned in the researches and conclusions of others, and skilled in reasoning from these to probable results of physical and chemical combinations.

And there is the great army of practical men, almost infinite in its degrees of quality—an indispensable link between nature's forces, as the philosopher thinks they are, and nature's materials, as the practical knows they are.

As the art precedes the science, let us first consider the matter from the artisan's—the "practical" man's—standpoint. While every day's experience could teach him a more helpful lesson, it could hardly teach him one of greater general importance than that the men who speculate from second-hand data upon the probable results of combinations of forces and materials, are not the men who can best make these combinations in practice; who intuitively know all the concealed pitfalls, such as friction—that trick of nature, which, like a thousandth part of phosphorus, alters all the conditions of use in iron—nor are they the men who can determine the completeness of these combinations or read the record of their results, as in the character of a flame, in the feeling of a refractory mixture, in the behavior of a metal under treatment; nor are they the men who, by familiarity with objects and phenomena, are best fitted to pursue that original investigation which is the foundation of even theoretical progress. The expert who delights to call himself "practical," is honestly amazed at the attempts of experts by school graduation, who have not been graduated in works, to solve the engineering problems of the day, and from his standpoint there are numerous and conspicuous illustrations. While metallurgists are still disputing over the nature and sequence of reactions in combustion and reduction, the practical iron smelter has felt his way from the barbarous practice of a century ago to the vast and economical production of to-day. The attainment of powerful and sufficiently hot blast, by means of waste heat, the adaptation of shape and proportions of stack to different fuels and ores, labor saving appliances and arrangements—all these have grown out of the constant handling not of books, but of furnaces.

Proceeding upon a chemical knowledge little superior to that of the average school boy,

\* Abstract of the address of Mr. A. L. Holley at the opening of the Washington meeting of the American Institute of Mining Engineers, Feb. 22, 1876.



Bessemer developed his revolutionary process, not knowing for years that the combustion of silicon or of manganese are the chief sources of the necessary heat, ignoring the fact that not alone the reactions but the presence of manganese is a cause of soundness and malleability in steel, magnifying the hypothesis that silicon should promote soundness, instructing his licensees to avoid irons containing above 0.02 per cent. of phosphorus, and sharing the ignorance of the whole metallurgical profession as to the sequence of reactions in the converter and the probability of changing their character. Bessemer and his followers, during the first 15 years of their practice, nevertheless, brought this difficult art, which the metallurgical world call a chemical art, to a high degree of commercial success, and this in the absence of any metallurgical change or chemical improvement whatever. During all this time there was almost no literature of the Bessemer manufacture, and no instructor save that grim sphynx, the converter, and the well nigh inscrutable process. It was a hand to hand fight, involving mechanical details, refractory linings, celerity of operations, regularity of melting and conversion and economy of labor. With every fact written in his book, the closest scientist could no more adequately prescribe the practical conditions of improvement, than could the student of optics specify in words and formula the glory of an Italian sunset.

Here is a cupola furnace, an old and exceedingly simple device; but one may know all the laws of combustion and fluxing that are laid down in the encyclopedias, and yet fail to change its working at will or detect the coming change until by long familiarity the phenomena reveal themselves, as it were, intuitively. The Siemens-Martin process, notwithstanding all that was known of the laws governing its calorific and metallurgical aspects, was brought to its present perfection not by scientists, but by men knowing nothing of books or at second-hand.

In the development of machinery the same facts present themselves. Modern formulas themselves are derived from the study of innumerable experimenters. Witness the locomotive. Machinery can only be perfected by him who, as it were, enters into it, making it an incarnation of himself.

These are the conclusions of the practical man, and they are none the less true because they are not the whole truth. That they are too little considered by the schoolmen and graduates of schools is also true, but happily less conspicuously so as the years advance.

The evil consequences of this mistake develop themselves in recent graduates demanding places of responsibility and authority after too short a term of object teaching. Their scientific training enables them to learn from objects and phenomena faster than the mere workman, who lacks the scientific reagent which precipitates the rubbish and leaves a clear solution of the problem. In iron works it is especially true that men of wide learning do not successfully compete for the desirable places with the men who have come up from the works.

Nor does this prove that the owners and managers of metallurgical enterprises are always unappreciative of scientific culture. It rather proves that the lowest functions, as in the case of poor humanity, must first be considered; that the condition of maintenance and regular working, which constant familiarity with objects and phenomena alone can provide, are earliest in order, conservatism first, improvement afterward.

Another consideration in this connection is that scientific aid appears to be more readily provided for the "practical" man than practical aid for the "scientific" man. The well meant attempts of the latter, with mere scholastic aids, to carry out valuable suggestions, might disorganize a whole establishment. Judgment founded on experience almost universally ranks the wider and more fruitful culture of the schools.

Another evil growing out of the inadequate regard of the mere schoolmen for practice, is the frequent failure of their works, or their inability to complete them, through a default of just this practical knowledge. A vast number of facts about the operations of forces in materials are so subtle or so incompletely revealed or disentangled from groups of phenomena, that they cannot be defined in words nor understood if formulated. A practical expert can, by a process more like instinct than reason, judge how far and in what direction he may safely put his new combinations. The engine builder will explain nine-tenths of the failures that occur, simply by the want of judgment founded on long observations of phenomena under similar conditions. Limited or impossible as would be the progress of engineering arts in the absence of that knowledge and those methods which are imparted in schools, delay and failure would hardly be less conspicuous if the schoolmen should stay in the schools and thence attempt the application of abstract science, or expect workmen to apply it by hearkening to their direction.

But the undervaluation of the study of objects and phenomena by schoolmen is not the principle hindrance to the complete union of science and art. A greater obstacle is the combined misapprehension and ignorance on the part of a large class of "practical" men of what they are pleased to call theory, meaning by theory something which is likely to be discordant with fact, or possibly with the interests of the craft. We can hardly complain that their objection is groundless, in so far as it is grounded upon the practice of theoretical men, but the world has a right to complain of their narrowness of observations, of their stolid incomprehension of the results of science, of that pride of ignorance, of that bigotry, of that positive, fear of the diffusion of knowledge, which is the normal condition of those who range only within the sphere of

their own practice, and to whom analysis and generalization, in their business affairs, as well as in morals and politics, are unknown things.

There is also a class of practitioners who do secretly respect the labors of the scientific investigator and profit by them, but from their own mental condition and acquisitions are distrustful of ideas, and are impediments rather than helpers in the union of science and art.

If it be true, as is often said, that there is really no antagonism between science and art, what shall we say of that phase of trades unionism which not only tends to repress improvement but which often violently defeats the work of progressive thinkers—and sometimes destroys their authors.

An extreme, but not isolated, case of the executive treatment of science can be observed in the cutting off to the paper mill, by orders of Jas. Fiek, Jr., of the priceless accumulation of reports and drawings of the engineering experiments of the Erie R. R. These cases are given only to correct a modern idea that engineering progress is as yet the creature of popular favor. It is refreshing to turn from these to the still exceptional but happily growing appreciation and helpful respect of practitioners and scientists for each other. When we see the recent graduate patiently leading the untrained workman into methodical habits of thought, and the rudiments of organized knowledge; when we see the grimy workman patiently teaching the graduate to recognize that matter in mass and under mighty forces which he had heretofore contemplated in cabinet specimens and chiefly in ideas; when we see the commercial manager of metallurgical enterprise open his works to graduates of schools, affording them an opportunity of completing their education, we may assure ourselves that one way has been discovered to promote the union of science and art.

In the enlargement of this method of mutual respect and instruction, to a certain extent, lies the solution of the problem under consideration, but it is complex and only operative under certain important conditions, such as

1st. A public opinion among school men that a course of object and phenomena study in works is a large and equal feature of that curriculum which is essential to a degree of professional graduation.

2d. A diffusion among practical men of a real appreciation of an organized system of information and of the scientific method of making this information useful to all classes and obnoxious to none.

3d. An understanding among those in charge of engineering enterprises that it is not a matter of favor but of interest to themselves, that trained young men should have an opportunity to master the practical features of technical education in works.

But these conditions do not largely exist, and it becomes us to inquire if some new order in technical education will not put the coming race of engineers on a plane lifted above the embarrassments from which we are slowly emerging.

1st. Technical schools should not only educate men of good general education, but artisans of good general education. The art must precede the science. We should, however, strongly discourage the beginning of a course of technical study, without at least such a knowledge of polite literature and general science as would fit one to enter a classical university. The want, not of high scholarship, but of liberal and general education, is to-day the greatest of all embarrassments which the majority of engineering experts and managers encounter. With our high schools this education is attainable.

But this is not all. Social and political relations, and even personal happiness, are governed, not by the specialties, but by the balance of mental culture. There is no danger of crowding out of existence special likings and talents by general culture. Our proposition is not that mere common school boys shall go into works and then into technical schools, but that young men of more general culture, when they do begin the business of technical education, shall apply to nature first and to the schoolmaster afterward.

It can hardly be urged against the precedence of practical culture that the student will get out of practice. He may, indeed, lose dexterity, but not the better fruits of experience. A most signal advantage of this course is that the mind is brought early into the consideration of those great elements of success which cannot be imparted in any other way—the management of labor and the general principles of economy in construction, maintenance and working.

2d. But the order of education is not the only desirable change. There is no organized system for guiding students to direct knowledge of objects and phenomena. This needs two explanations: I. Apprenticeship is a school of skill rather than of liberal art, intended for the class of men who intend to remain mere workmen. II. A school of engineering practice would be wholly impracticable.

There can be a school of practical engineering, but it cannot be mere apprenticeship nor a system of engineering construction and operation, maintained merely for the purpose of a school.

The only alternative is to establish organized schools in the various existing engineering works. Though this may seem subversive of all discipline and economy, I am assured by experts that such would not be the case. Students should be expected to do good and full work during specific hours. This is not a mere idea, but has been put into practice at several Bessemer works, and I have yet to hear of its embarrassing the management in any way.

The proposition is to enlarge and systematize the existing desultory study in works, to increase its usefulness to the student, and at the same time to make the granting of such facilities to students an object, immediately as well

as remotely, to the owners of works. To this end the schoolmaster should himself be a practical expert.

It should thus appear that three somewhat radical changes in the curriculum of engineering study—first, a hand-to-hand knowledge, acquired not desultorily, but by an organized system, and afterward the investigation of abstract and general facts and their relation—would largely economize the student's time and better the quality of his knowledge.

Prof. T. Egleston.—The subject of the president's address is one of very great importance to the profession. There is, it is evident to all, a want of concord between the school men and the manufacturers, but the want was all on the part of the manufacturers. The president has shown us where the knot is, but has not cut it himself nor helped us to cut it. The unwillingness of the manufacturer to allow the student or professional man facilities, not for seeing the secrets of the trade, but the every day manipulation, amounts sometimes to almost an obstruction to education. There are those who afford every facility, and who do not acknowledge the antagonism to exist, but it is not generally the case, and we mark and honor the exception. Nor does the harm always come from the direct opponents. It often comes from the friends. We of the schools send students to the works to acquire knowledge, not to gain information, and some of our friends furnish schedules, complete estimates and lists of prices, in the most friendly manner, thinking to do a service. The result is that the poor men copy them verbatim, but the incontinent engineer declines to use them as such, as his conditions are not the same, and what was intended as a kindness is often no help to the investigating student, and a weight which helps to drag down the man who is willing to copy; such co-operation is not what is needed, and is no kindness. When the School of Mines in New York was first started, it was stated that for students who wished it application would be made for permission to work in mining and metallurgical establishments as the highest reward of engineering scholarship which the faculty could offer; but was soon obliged to withdraw the promise, since the manufacturers would not grant the permission. Yet it is easily to be seen that out of such men, working for a given time without wages, the manufacturer might make, if he would, men of a high order of engineering ability. The difficulty is to make the manufacturer see that it was for his interest to have men trained to see, and then to think. The day I graduated from college I left the machine shop in which I had been working and went to take my diploma and went back again to the shop, and after nearly a year's work went to a technical school. For the first year and a half that I was in the profession, though in charge of very large mines, not a single important question involving mining arose, but there were constant questions of pumps, engines, &c., and I was led at first to think little of my technical education until it became evident that the power to use the knowledge gained in the machine shop was the result of the technical training. What the president has laid out as a practical course means that men would not get into their profession until they were 30 years of age, which, in a certain point of view, is an advantage, but could not be done here. What is needed is to increase the requirements and advance the age of admission to our technical schools, and then to overcome the antagonism of the manufacturers, and induce them to allow the graduates to continue their study with them until they could learn enough of the professional work they must do, to feel and hear, almost by instinct, as the president has so forcibly said, what they were to do. Such a system would soon train a class of engineers not to be had now. It is easy for the schools to give men the theory, but where are they to get the practice if the manufacturer, miner and metallurgist is to stand by them and say—yes, you ought to swim, you must swim, but we cannot by any means allow you to go into the water until you have learned how to swim.

Mr. Jos. D. Weeks.—I cannot agree with the last speaker that there is always this want of concord, this disinclination on the part of manufacturers to allow scientific investigations to be made at their works, or if such a want or disinclination does exist, that it is entirely on the part of the manufacturers, or without reason. So far as my experience has gone, I have found the iron manufacturers of my own city, Pittsburgh, very ready to grant facilities for investigation, and work in perfect harmony with me in making experiments. At the works of Messrs. Rogers & Burchfield I spent many days experimenting on the use of natural gas in the puddling furnace, being at liberty to make any change in furnaces or their working I chose. At Messrs. Spang, Chalfant & Co., so far as I am aware, there has been every facility granted. But a week ago two gentlemen connected with the State Geological Survey were at these works making some very thorough experiments, and I know that a young gentleman, a graduate of the Dr.'s own school, the School of Mines, has been at these works for weeks.

Prof. R. W. Raymond thought the question of furnishing information to visiting students was chiefly one of courtesy and of present policy, while the question of giving a practical knowledge to students, or those who were to become such, was a much deeper one, bearing upon all the future. He thought that in many cases the questions asked of managers by students who called upon them were of a kind to embarrass one party without really benefitting the other. With regard to the suggestion of the president, that there are many considerations of practice which cannot be formulated, Mr. Raymond thought a large part of this imagined inability would disappear when greater culture was introduced among practitioners. A mind trained to think and to express thought would deal promptly with many of the customs and rules

of practice, discarding one-half as superstitions or survivals from necessities now obsolete—like the rudimentary organs of Darwinism—and classifying, explaining and formulating the rest. The speaker did not believe much in rules or practices which could not be formulated. The trouble was the inability or disinclination of practitioners to state the facts. The president's recommendations would abate this evil. With regard to the combination of technical instruction with practice, perhaps the *Steigerschulen*, of Germany, are a good example. They have furnished some excellent mining engineers and metallurgists. He thought the introduction of a preliminary course of practical training before the scholastic training would be a great benefit to the schools themselves. It would weed out the hopelessly stupid or lazy or otherwise unfitted, and bring to the schools a class of young men who already knew what they wanted and really wanted it. The great difficulty with the schools to-day was to recommend themselves to the public—to parents. This could be done by the original investigations and publications of the professors, and still more by the practical achievements and business success of the graduates. Anything which tended to increase the chances of graduates to obtain opportunity of advancement, and to acquire themselves creditably therein, would benefit the schools. On the part of parents, the trouble is that they are in too great a hurry, and it is imperative that we should prove to them that a more thorough and prolonged training pays. Too many educators are at present engaged in the ridiculous attempt to adopt from the German system of university education everything *except the time it takes*. We keep on taking out a little more classics and shoving in a little more science in our curricula of education, leaving the whole thing to be crammed in the same space as before. The speaker thought the only solution was to give more time, and most heartily agreed with the president that lack of general culture—of the knack of study, the power of statement, the sense of order and logic—was one of the greatest defects and drawbacks to the engineer. No illiterate man (using the term in a broader sense than that of inability to read and write) could become a distinguished engineer; or, at least, the most able engineer, if deficient in the culture which gives men power over their fellows, would be the first to recognize the lack, and lament the cause that had so crippled his usefulness and stopped him almost at the summit of that fame which could be completely climbed only by complete men. One of the members of the Institute, a gentleman of high reputation as a manager of mines and works, had recently said to the speaker that he had concluded, after much observation, that a regular collegiate education was the best preparation for a technical one, and that the time so spent was well spent, and showed its benefit surely at the other end of the student's career.

Mr. Eckley B. Coze.—I, to a certain extent, had a practical education before going to the technical schools of Paris and Sweden. During a portion of my youth I lived in the coal region, and having a liking for such things, spent a great deal of time in the mines, machine shops, foundries, etc., of that region, and made and assisted in making surveys both above and below ground. I found this practical education of immense importance to me in my technical education, enabling me to understand the details of mining, etc., treated by the professors.

There is another point—the mechanics we have at present are generally men who do not serve regular apprenticeships, or if they do, work only at one or two nearly perfect machines—the amount of skilled labor in the large shops being reduced to a minimum, one man works almost all his life at one machine instead of at all sorts of jobs. A carpenter to-day gets almost all his work from the mills, and is more of a fitter or joiner than a carpenter, and few carpenters work more than a year or two as carpenters. Years ago a carpenter or machinist had to learn his trade thoroughly, and hence he was more familiar with the details of his business and would not require foremen of such ability at present.

A mechanical engineer should therefore be acquainted with details of work, so as to be able to utilize those imperfect mechanics. A machinist must now go to a country shop, where the machinery is imperfect, in order to become a thorough workman in all the branches in the trade.

In conclusion, I can only say that I feel it would have been of great assistance to me in my education if, before going into the technical schools, I had worked practically in a machine shop and foundry for a year or two.

Mr. E. C. Peckin.—It is difficult to get graduates to look upon what they do when they leave college as an essential part of their education. I have received many letters from recent graduates, asking for all sorts of positions as experts, chemists, metallurgists, etc. They seem to want comfortable situations and not a place to do work.

There have been and are many exceptions to this rule. I had at our works a gentleman who had taken a thorough technical course, who spent two years in getting a practical education in blast furnace work, and I consider him to-day among the foremost blast furnace men in the country. What we need in graduates is what is so essential to the completeness of the American character, patience, and if they would consent to give a year or more to such practical work they would find themselves making much more rapid progress.

Prof. R. H. Thurston.—As an artisan, he recognized the force of what was said as to the opinions of the schoolmen. As one, sometimes called a schoolman, he also felt the force of what had been said as to business men.

Several courses may be suggested in technical instruction and training. I throw out of our

consideration the plan which is often adopted of sending a boy to school until he is 10 or 12, and then putting him into the shop, denying the advantages of a technical education on the ground that it unfits men for work. Assuming the necessity of a technical education, three courses could be advised. 1st. To send the student to school until he gets a good common school education, then a technical one, and then to the workshop and told to begin to learn. 2d. To give first a high school education, then to the workshop, then technical. 3d. A mixed education, that the boy during his course spend his spare hours around the works, and even when in the technical school, spend his vacations in the workshop in actual work.

The course usually pursued is generally the first, and exceptionally the second, and rarely the third, as it requires extremely exceptional opportunities. I am strongly in favor of the third, perhaps because of prejudice in favor of my personal experience, but this is out of question as a regular course, and we are forced to choose between the other two. The first is usually chosen on account of existing conditions, but the second is the best, both for the men and the school.

The crying need of technical schools is a more complete fitting of the students sent them. Many who seek admission are unable to pass the preliminary examination, and many who pass this examination and are admitted fall out at the close of the first term, the failure arising from a lack of preliminary general training.

Technical schools need also to broaden their course.

Mr. E. B. Coze.—In the paper under discussion, one thing seems to be left out, and that is what Darwin terms the survival of the fittest. We always hear of the one man who becomes a coal operator, but of the 150,000 others we never hear.

One great thing needed, that cannot be learned in the school, is how to deal with men; how to make them work in accordance with your ideas. You may make a perfect plan, and have a complete drawing, but if you cannot impress it upon your master carpenter, or master blacksmith, you cannot make it work. They will put a bolt wrong somewhere. I have found it necessary to show the men that I know what I am about, in order to give them confidence that there is a meaning in what they do not understand.

Another trouble is the difficulty of graduates in understanding that they are not mining engineers, for example, but only fitted to study.

The word engineer has become mixed in its meaning. I had a cart driver. After a while I put him to tending a hoisting engine. Now he is an engineer. I had a slate picker in the mine. After a while he became a stake driver, then a rod man, then in charge of the back sight, and finally got to use the transit instrument. Now he is an engineer. After a while business grows slack, and they go back to driving carts and picking slates. So that in the popular mind an engineer is one who drives a cart or picks slate, and popular ideas of what is the proper pay of an engineer are too often on the basis of such occupations.

Graduates must not at first expect anything but their board. They will make mistakes enough to cover what their wages should be.

O. J. Heinrich.—He was glad to hear Prof. Thurston favor the third course, and the only question is how to make it practical. This course is adopted to some extent in Germany, architects and masons, for example, pass their summers in practical work, and their winters in the technical schools.

I have often found in my work that it is necessary to take off my coat, and show my men how to do the work. It will be found oftentimes that the men are so wedded to their ways of doing things that they think there is no other way of accomplishing it.

The plan suggested by Prof. Thurston I heartily affirm. A good deal can be picked up by a boy going about works, and it don't leave him. He don't have a note book with him, but this may be all the better, as when the note book is lost the information is gone.

No man is capable of instructing in practical science unless he is a practical man himself, and becomes thereby capable of separating useless stuff from that which is valuable.

One very important object we should keep before us, is to give our workmen a chance to educate themselves at their leisure times or at night.


There is a difference, and a great one, between managing colliery works in this country and in Germany. In the latter country the workmen have been brought up to their work from boyhood, and the manager has only to direct his boss or foreman to do a certain work and he knows how to do it, and it is done. In this country the manager has no such advantage, but must give the detailed directions. We must educate our workmen up to this point, so that they may equal the German in this respect, and thereby relieve the manager of much of his detail.

Mucilage for Minerals, &c.—Mr. F. C. Hill, of the Geological Museum, Princeton, N. J., writes to the *Journal of Pharmacy* as follows: "My friend, Professor R. P. Whitfield, of Albany, N. Y., was good enough to give me the following recipe for mucilage to mend fossils and minerals, and, after several months of experience with it in the museum, I find it so valuable that, with his permission, I send it for the benefit of the readers of your journal:

Starch ..... 2 dr.  
White Sugar ..... 1 oz.  
Gum Arabic ..... 3 dr.  
Water ..... 4 s.

"Dissolve the gum, add the sugar and boil until the starch is cooked. Professor Whitfield is in the habit of drying it into sheets, on paper, and re-dissolving when wanted. He does not claim to have originated the recipe, but thinks it is one of the compositions offered to the United States government for gumming stamps. It is certainly a very adhesive mucilage, and, owing to the sugar, never becomes brittle; so that it never scales off, as most glues do, from stones or other hard substances. In a geological cabinet it is simply invaluable."





## TACKS

FACTORY, Fairhaven, Mass. **AMERICAN TACK CO.**, SALESROOM, 117 Chambers St., N. Y.

Upholstery, Gimp, Brush, Card, Pail and Cheese Box Tacks; Leathered, Tinned and Iron Carpet Tacks; Bright and Blued Finishing Nails; Cigar Box and Chair Nails; Trunk and Clout Nails; Brads, Patent Brads, Copper Tacks and Nails; Iron, Zinc, Steel and Copper Shoe Nails; Polished 2d and 3d Fine Nails; Roofing and Siding Nails; Roofing Tacks, Tinned Tacks and Nails of every variety. Any size or style of Tack or Nail made to sample. Orders sent to either Factory or Salesroom will receive prompt attention.

## PYROMETERS

for BLAST FURNACES.

E. BROWN'S STANDARD PORTABLE,

E. Brown's Improved  
Gauntlet



**Edw. BROWN,**  
311 Walnut St., Philadelphia.

ALSO FOR SALE

## PYROMETERS

For Baker's Ovens, Boiler Flues, Galvanizing Baths, Oil Stills, Vulcanizers, Superheated Steam.

Over 300 "Gauntlet" and 100 Portable Pyrometers are now in use at Blast Furnaces.

E. Brown's Portable Blast Gauge for the plug hole, Steam Gauges, Blast Gauges, Mercury Gauges, Recording Steam Gauges, Engine Counters, Indicators for ascertaining the Horse Power.

ALSO,

## REVOLUTION INDICATORS.

The Revolution Indicator is driven like a governor, either from a horizontal or vertical shaft; it constantly indicates, without the use of a watch, the number of turns per minute made by a Steam Engine.

There are many engines which have to run at varying speeds for different operations, also engines controlled entirely by hand. For such, the Revolution Indicator will be found particularly useful.

Circulars on application.

## TURPENTINE and ROSIN BARREL TRUSS HOOPS.

A large stock always on hand at lowest prices. Also full line of

**Coopers' Tools**  
For Turpentine Trade.

Send for prices to  
**CHAS. E. LITTLE, 59 Fulton St., N. Y.**

## FOOT LATHES.

Address,

**W. E. LEWIS, Cleveland, O.**  
Catalogues free.



**JAMES MACDONALD,**  
Manufacturer of **FISHING RODS,**  
43 Maiden Lane, N. Y.

## HOLLOW WARE

At Wholesale.

**GEORGE W. FLETCHER,**  
110 John Street, N. Y.



**Schaeffer and Budenberg,**  
Magdeburg,  
Germany.

Steam, Blast, Vacuum and Hydraulic  
Gauges, Engine Counters, Pyrometers, Brass Patent  
Governor, Steam Reducing Valves, etc. Sole Depot,  
**W. HEUERMAN, 4 Cedar St., N. Y.**

## JOHN CARVER,

Manufacturer of

**Caulking Irons,**  
**COTTON, FREIGHT & Hay Hooks, &c**  
288 Monroe Street, NEW YORK.

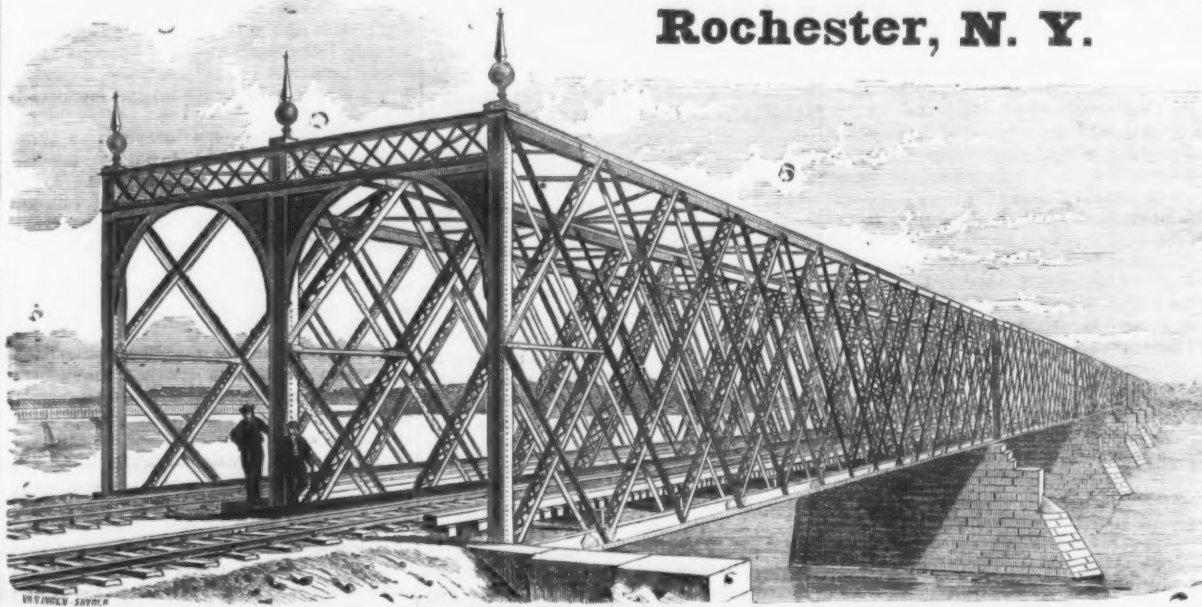
**J. Billerbeck & Co.,**  
**KEYSTONE SCREW CO.,**

Manufacturers of

**Iron Gimlet-Pointed Wood Screws,**  
17th & Venango Sts., Philadelphia.

## LEIGHTON BRIDGE AND IRON WORKS,

Rochester, N. Y.



Wrought Iron Riveted  
Lattice Railroad

AND

**HIGHWAY BRIDGES.**

Wrought Iron

**WATER PIPE,**

The most economical and durable Pipe man-  
ufactured for Water Works, Oil Lines or Gas Mains.

**General Riveted Work**

Orders solicited from Civil Engineers  
and Contractors.

[Accompanying engraving represents the Spring-  
field Bridge, built by the Leighton  
Bridge and Iron Works.]

**SPRING PERCH CO., Bridgeport, Conn.**

Established 1843. Manufacturers of FIRST QUALITY

## SPRINGS & AXLES

And Beer's Patent Curtain Rollers, Concealed Hinges, Etc., Springs of any pattern made to order. Send for Circular and Price List.

**GET THE BEST.**

## HALL'S Sudden Grip VISE.



The Quickest,

Most Convenient, and

Most Complete

**VISE ever devised.**

A Push closes and grips. A pull opens the jaws to any extent. The Swivel is Auto-  
matic, will swing on the cable to any angle and fasten itself. Made in the best manner of  
the best material. Send for a Circular. **AGENTS WANTED.** Address,

**THOMAS HALL,**

411 Fulton Street, - - - **BROOKLYN, N. Y.**

Manufactured by **CHARLES PARKER, Meriden, Conn.**

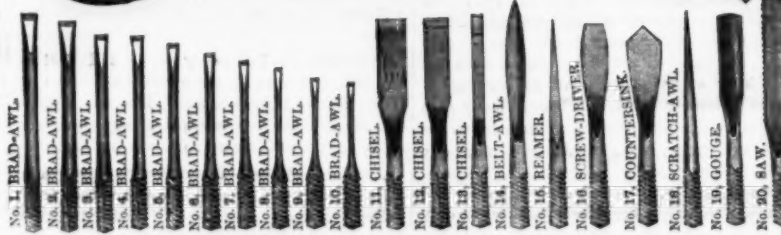
**J. CLARK WILSON & CO.,**

Manufacturers & Jobbers of Hardware, & Manufacturers' Agents.

81 BECKMAN STREET, N. Y. P. O. Box 2355.

REDUCED PRICE OF

**H. CLARK'S SUPERIOR BRAD AWLS AND TOOLS.**



This cut is 1/4 the actual size.

No. 1, Brad Awls only (10 awls). Polished Apple Handles, per dozen, \$10 50  
No. 2, and tools (20 tools). Polished Apple Handles, per dozen, 12 50  
Packed in Black Walnut Boxes with slide cover, of 1-2 doz. each.

Also, Agents for **WILDER'S SOCKET SCRATCH AWLS.**



WARRANTED CAST STEEL.

Packed in Paper Boxes of one dozen each. \$1 30—Discount 20%

**BIRMINGHAM SCREW CO., Limited.**

**ALFRED FIELD, President.**

The Screws of this company are imported only in small, limited quantities.

**ALFRED FIELD & CO.,**

Sole Importers,

93 Chambers and 75 Reade Streets, N. Y.

## STAFFORD MANUFACTURING CO.'S Stencil Combinations.



Containing: Stencil Alphabet, Figures, Can Stencil Ink  
and Brush.

For marking boxes, barrels, bags, and packages for ship-  
ment. Printing all manner of showcards, notices, signs, num-  
bers, prices, &c., and other purposes too numerous to men-  
tion. Instructive and amusing for boys.

**WHOLESALE PRICES.**

Size.	per dozen.	per dozen.	per dozen.
1/2 in.	\$5 00	1 1/2 in.	\$10 00
3/4 in.	6 00	2 in.	12 00
1 in.	7 00	2 1/2 in.	18 00
1 1/4 in.	9 00	3 in.	with lower case, 15 00

An Illustration of sizes sent on application.

For sale by Hardware Dealers and Stationers.

**No. 66 Fulton Street, New York.**

## THE DOUGLASS MFG. CO.,

New York Warehouse, 62 Reade Street.

P. O. Box 2610.

**FACTORIES,**

Seymour, - - Conn.

MANUFACTURERS OF

**PREMIUM**

**Mechanics' Tools,**  
**COOK'S**

**Boring Implements**

Price List and Discount Sheet furnished  
on application.

We Use in Manufacture  
**BEST ENGLISH**  
**Cast Steel.**

AND

**GUARANTEE QUALITY and PRICES.**

Chisels and Drawing Knives of all kinds, Screw Drivers, Screw  
Driver Bits, Cook's and Douglass Mfg. Co. Augers & Bits,  
Wood and Metal Head Gimlets, Improved Hollow  
Augers, Blake's Patent Extension Bits,  
Boring Machines, Chisel Handles, Wood Boxes, Tool Chests.

We Invite Competition on quality and offer our Manufactures  
**AT TRADE PRICES.**



## ALEXANDER BROS

MANUFACTURERS OF **TANNED**

**PURE OAK**

## LEATHER BELTING.

410 & 412. NORTH THIRD ST. PHILA.



# SELECTIONS FROM THE ILLUSTRATED LIST OF THE DOUGLASS MANUFACTURING COMPANY.

PREMIUM MECHANICS' TOOLS made of BEST ENGLISH CAST STEEL.

New York Warehouse, No. 62 Reade Street, P. O. Box No. 2610.

Long-Eye Cast Steel Bright Lip or Cuban Augers.



Post Augers.



Long-Eye Augers, (Black Lip).



Short Bright Augers.



Cook's Ring Augers.



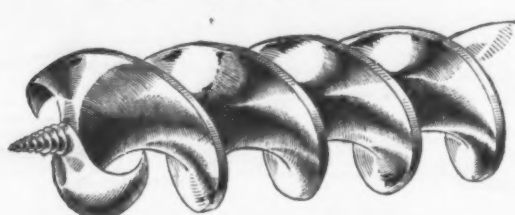
Short-Eye Augers, (Black Lip).



Long Bright Augers.



Cook's Patent Augers and Bits.



D. M'g Co's Millwright Augers.



D. M'g Co's Cast Steel Bits.—EXTRA.



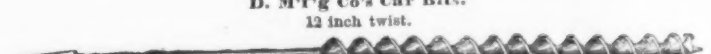
Superior Gas Fitters' Augers.



Cook's Cast Steel Bits.



D. M'g Co's Car Bits.  
12 inch twist.



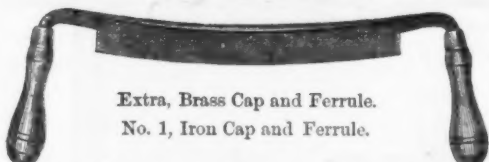
Cast Steel Machine Bits.



D. M'g Co's Boring Machine Augers and Bits.



Drawing Knives.

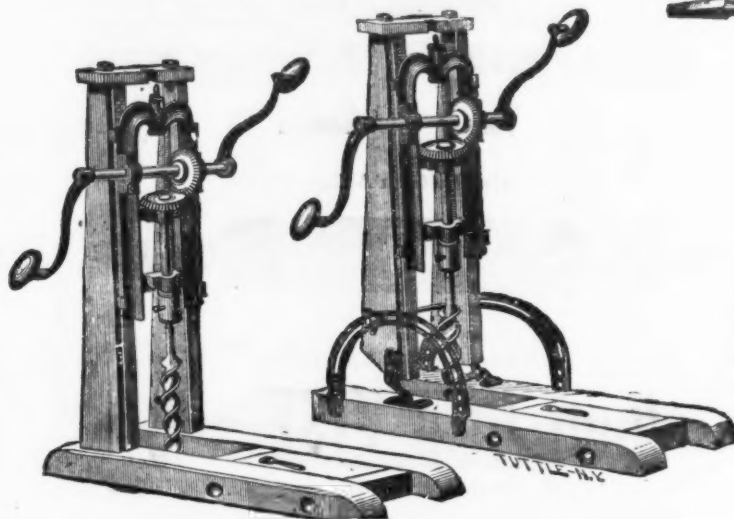


Extra, Brass Cap and Ferrule.  
No. 1, Iron Cap and Ferrule.

Farmers' Drawing Knives.



Improved Boring Machines, Graduated Ways.



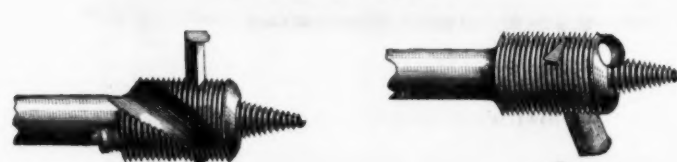
Shingle Knives.



Wagon Maker's Drawing Knives.



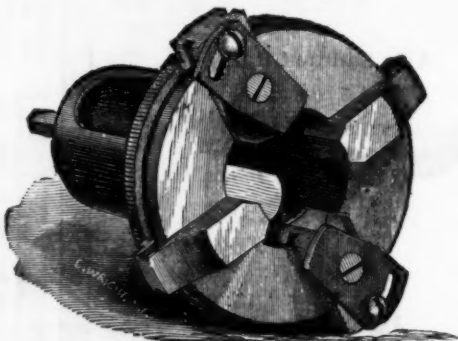
Blake's Expanding Bit.



Douglass' Patent Auger Handles.



Universal Hollow Augers.



Improved Hollow Augers.  
Douglass' Patent.



Screw Drivers.



Steel Gimlets.



Chisel Handles.



Carpenters' Slicks.



D. M'g Co's Firmer Chisels.—EXTRA.



Millwright's Firmer Chisels.—EXTRA.



Oval Back Socket Framing Chisels.—EXTRA.



Socket Framing Chisels.—EXTRA.



Socket Framing Millwrights' Chisels.



Corner Chisels.



Socket Firmer Chisels.—EXTRA.



Reamers.



Turning Chisels.—EXTRA.



Turning Gouges.—EXTRA.



Ring Tap Borers.



C. S. Paring Firmer Gouges.—EXTRA.



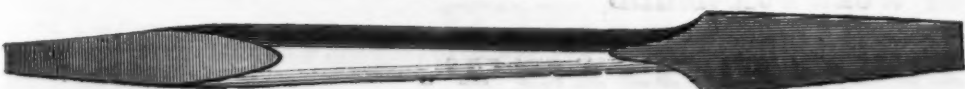
D. M'g Co's Firmer Gouges.—EXTRA.



Superior Socket Firmer Gouges.



Screw Driver Bits.



Counter Sinks.





# H. D. SMITH & CO.,

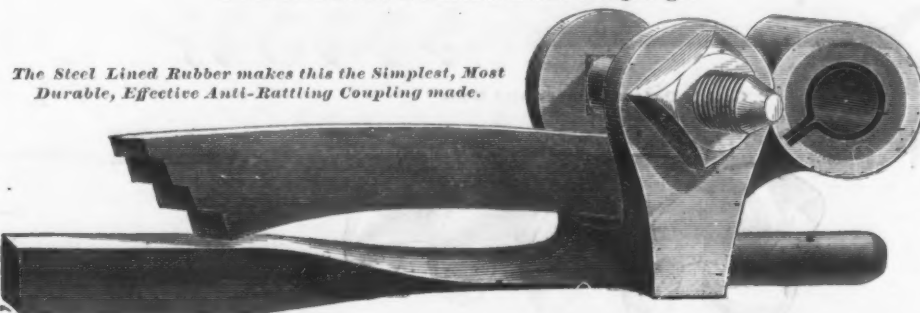
## Plantville, Conn.,

Manufacturers of the

### BEST QUALITY CARRIAGE MAKERS' HARDWARE.

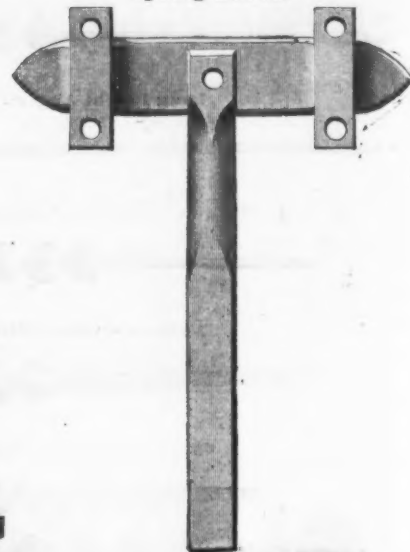
Patent Whiffletree Bolt,  
Bent Pattern.

Smith's Patent Noiseless Shaft Couplings.



*The Steel Lined Rubber makes this the Simplest, Most Durable, Effective Anti-Rattling Coupling made.*

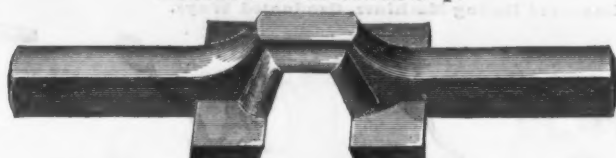
Spring Brace.



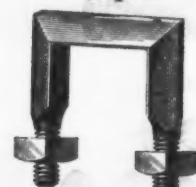
Felloe Plate.



Patent French Coach Clip.



Short Spring Clip.

New York  
Slat Irons.

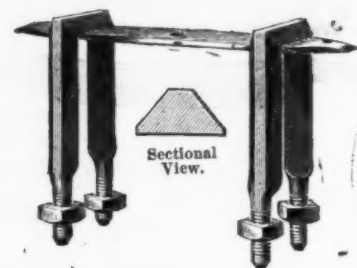
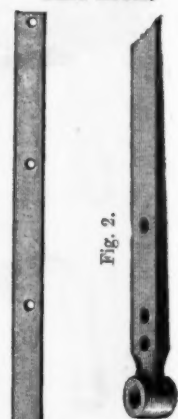
Saddle Clip, Octagon Pattern.



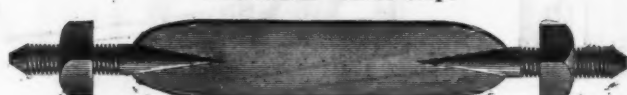
Plain Pattern Axle Clip.



Saddle Clip, Skeleton Pattern.

Philadelphia  
Slat Iron.Sectional  
View.

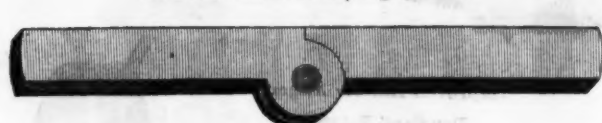
"The Anvil" Axle Clip.



Spring Bar Clip.—Smith's Pattern.



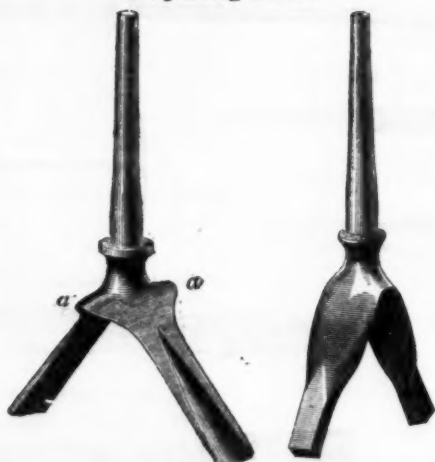
Smith's Milled Stump Joint.



Axle Saddle Clip.



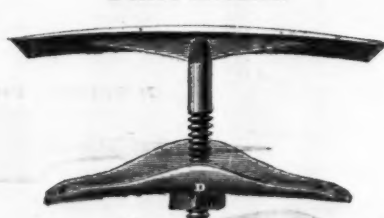
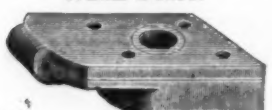
Clip King Bolts.



Improved Shaft Bolts.



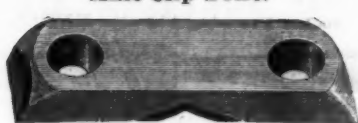
Felloe Holders.

Brewster & Co. Patent  
Whiff Plate.

Loop Yoke.



Axle Clip Yoke.



Safety Loop.



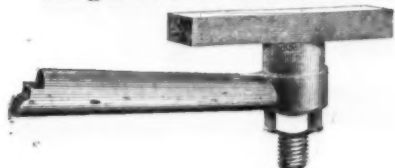
Coach Axle Clip.



Cross Bar Step.



King Bolt Yoke and Brace.



5th Wheel Anti-Rattler.



Thomas Top Prop.

Brewster & Co. Pat.  
Felloe Joint Bolt.

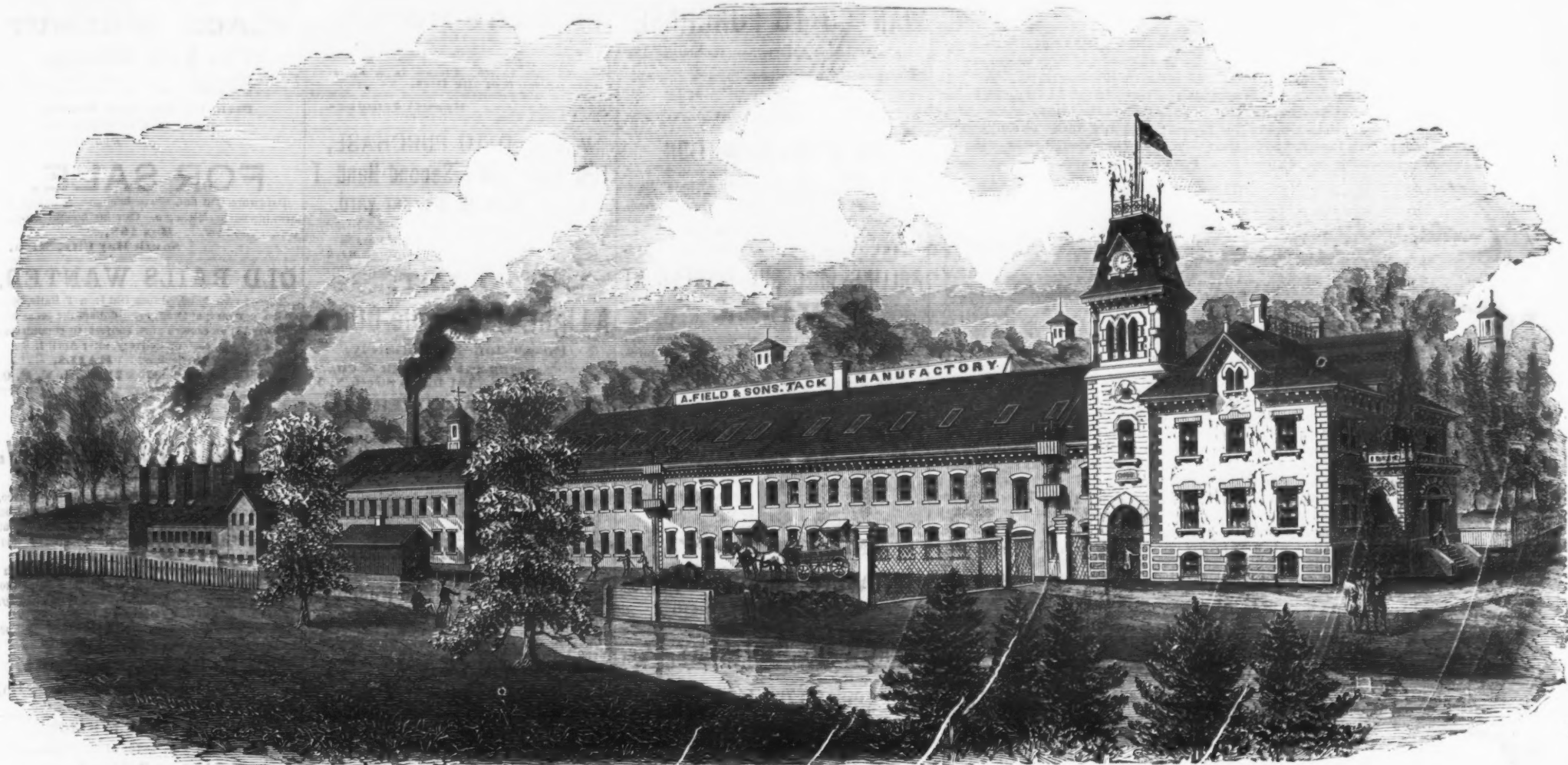
Manufacture the Largest Variety of Forged Carriage Irons of Best Material and Workmanship.

PRICES LOW FOR QUALITY OF WORK FURNISHED.

SEND FOR PRICE LIST.



ESTABLISHED 1827.



ENTIRE LENGTH OF WORKS 700 FEET.

# A. FIELD & SONS

TAUNTON, MASS.

Manufacturers of

## TACKS

## NAILS

BRADS AND PATENT BRADS.

IRON  
COPPER  
TINNED  
SWEDES IRON  
UPHOLSTERERS'  
CARD CLOTHING  
PAIL AND TUB  
GIMP  
LACE  
PATENT COPPER PLATED  
LARGE HEAD CARPET

FINISHING  
TRUNK  
CLOUT  
CHAIR  
CIGAR BOX  
HUNGARIAN  
HOB  
SILVERED OR JAPANNED LINING  
SILVERED OR JAPANNED SADDLE  
TUFTING  
COPPER CUT

LEATHERED CARPET  
TINNED CARPET  
COLORED COATED CARPET  
COFFIN LINING  
MINERS'  
BRUSH  
LOOKING GLASS  
SHOE OR LASTING  
ROUND HEAD  
ROOFING  
EVERY STYLE OF

BOAT REGULAR  
BOAT CHISEL POINTED  
FINE TWO PENNY  
FINE THREE PENNY  
PATENT COPPER PLATED  
CHANNEL  
AMERICAN IRON SHOE  
SWEDES IRON SHOE  
ZINC SHOE  
STEEL SHOE  
CHARCOAL IRON SHOE

With New, Improved, and Patented Machinery, we shall now make

## GLAZIERS' POINTS,

ONE OF OUR SPECIALTIES.

Any variation from the regular size or shape of the above named goods made from samples to order.

QUALITY GUARANTEED TO BE SATISFACTORY.

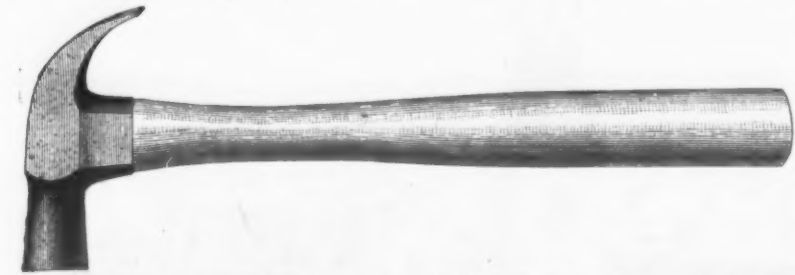
OFFICES AND FACTORIES. - - - - - TAUNTON, MASS.

Warehouse and Salesroom at 78 Chambers Street, New York.

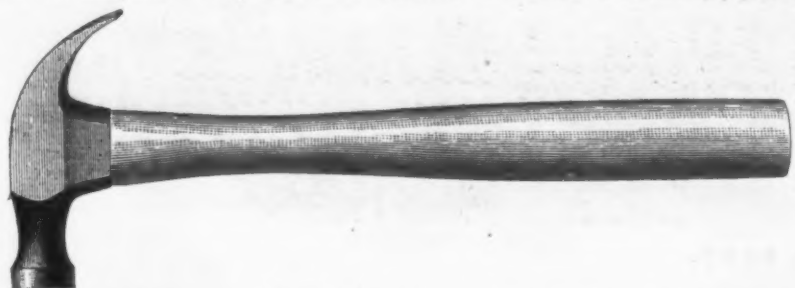


## Hammond's Solid Steel Hammers.

We produce herewith illustrations of two different styles of these hammers, which are made in a large range of sizes. The heads are forged under a heavy drop, the consequence of which is that they are not only exceedingly solid, but are exact in size, shape and weight. Neither hammer head marks or imperfections due to forging are perceptible, the hammer heads coming so smooth and perfect from the drop that it is almost impossible to distinguish one from another selected at random. They are much smoother than even the best castings. The drop is also capable of producing finer and better forms than are secured in the process of casting. Mr. Hammond is a practical mechanic, and has had a great deal of experience in the production of intricate forgings for gun work and the like. He is now getting up a line of hammers suitable for all classes of workmen, all of which will be of the same standard of workmanship as those illustrated. In style and finish the



markable for a heavy decline in prices as 1872 was for its unprecedented advance. This country continues to be England's best customer for plates. The statement of exports for the United Kingdom, for 1875, shows shipments to the United States of 1,673,435 boxes, out of a total to all ports of 2,448,986. The statements of the years 1874 and 1873 show that, although the total exports to all quarters had fallen from 2,153,477 boxes in 1873 to 2,143,468 in 1874, the number sent to the United States ports increased in the same time from 1,511,632 to



hammers of his manufacture, which we have seen, seemed to leave nothing to be desired, either in finish or their balance in the hand.

## PHILADELPHIA CORRESPONDENCE.

Office of *The Iron Age*, 220 South Fourth st., PHILADELPHIA, Feb. 29, 1876.

There is but little change to note in the coal trade in any of its departments. The weather, with the exception of two days, has been quite mild, and it is too late in the season to look for a protracted period of cold. Mining operations and shipments have been suspended in all the regions, and it is not likely there will be a full resumption of work before the 1st of April. The bituminous trade has been quiet, with no considerable sales or heavy contracts reported. The rates of transportation in the Cumberland regions have not yet been adjusted. The Baltimore and Ohio, and the Pennsylvania Railroads, it is expected, will reduce their rates to such prices as will incite a lively competition between anthracite and bituminous coal, and there is no doubt that, owing to the high prices of the former, the latter has been making a good deal of progress with manufacturers, for steam purposes. The Reading Coal and Iron Company have transferred the whole of their retail coal trade, in this city, with the several yards employed in such trade, to the well-known firm of Bines & Sheaff, parties whose experience in the handling of coal will enable them satisfactorily to serve the old patrons of the Coal and Iron Co.

In the iron trade there is no apparent improvement, and business drags along in the same heavy, monotonous manner so frequently noted for months past. Sales are on the most limited scale, and low prices do not induce purchasers to go beyond their immediate wants, and the present tendency appears to be toward still lower prices. Consumption is going on, however, and stocks of manufactured goods must be getting reduced; wear and tear is going on as formerly, and we may reasonably, and certainly, look for a marked improvement soon. Production in many branches has, undoubtedly, been in excess of consumption, but the necessities of business the past two years has also compelled a reduction of stocks, and when the demand for manufactured goods again sets in, it will, probably, be steady and permanent. Some of our large establishments are working full time, and there is more doing than for some time past. A very interesting feature in our exports last week was that of the Baldwin Locomotive Works, consisting of twelve locomotives for Brazil. The ship Galates cleared out Saturday last for Rio de Janeiro, and was chartered specially for the conveyance of these locomotives and other machinery from the same establishment. This firm (Burnham, Parry, Williams & Co.) is still working full time on contracts for our home railways, and report fair prospects for a continued healthy trade.

A remarkable feature in the trade of Philadelphia is the continued enormous increase in the value of its exports and imports, the increase in each being about 100 per cent. to date, as compared with the first two months of 1875, while three first-class transatlantic steamers, with full cargoes, have arrived within the past 24 hours.

Another valuable and rapidly increasing branch of business is the importation of tin plates, in regard to which we append the following statement and review, kindly furnished by one of the leading houses in the trade:

"The indications are of a generally fair business in tin plates. The depressed state of prices and weakness of demand at the works

abroad is not met by an exactly similar condition here; inquiries are frequent and of wide range, with considerable activity in buying by those who agree in the common expectation, that this immediate season is favorable for purchase on account of the early occurrence of the only change possible—a certain and possibly sharp advance in prices. The high price that ruled in 1872 was undoubtedly responsible for the erection of new works abroad, and the trade there is now suffering from over production. But the year just closed has been as re-

markable for a heavy decline in prices as 1872 was for its unprecedented advance. This country continues to be England's best customer for plates. The statement of exports for the United Kingdom, for 1875, shows shipments to the United States of 1,673,435 boxes, out of a total to all ports of 2,448,986. The statements of the years 1874 and 1873 show that, although the total exports to all quarters had fallen from 2,153,477 boxes in 1873 to 2,143,468 in 1874, the number sent to the United States ports increased in the same time from 1,511,632 to

1,585,994. As to the direct shipments to this city, which are more particularly interesting, figures are at hand showing the exports from Liverpool (which is the great distributing point) direct to Philadelphia, for 1875 were 207,077 boxes, as compared with 168,694 boxes in 1874, an increase of about 23 per cent., while the total exports from all British ports to United States ports were 1,585,994 boxes for 1874, and 1,673,435 for 1875, or an average increase of only about 5 per cent. Looking now to the prospects of this year, such indications as are furnished by statistics of January trade, give reason for very favorable anticipations, the shipments from abroad showing an increase of 24,333, compared with January, 1875. Continuous roofing plates and 28x30, both of which sizes are controlled by one large Philadelphia house, have been in fair demand, and for first class work are fully appreciated. The production of decorated tin plates has been larger the past year than ever, and the various uses to which it is put are only limited to articles that can be manufactured from tin plates."

**Exporting Cotton Goods to England.**—The Fall River correspondent of the Boston Journal says that the beneficial results accruing from the shipment of cotton goods to England are becoming every day more apparent, and the outlook is decidedly hopeful and encouraging. The success of Mr. George F. Hathaway's visit to England is shown in the great activity and busy bustle among the Fall River mills. About 15,000 pieces of print cloths—one-eighth of the entire production of the city—are now exported each week, and for these goods better net prices are received abroad than at home. It has been said that the Fall River manufacturers sought by this movement simply to "tide over" an unusually depressed period, and the inference has been drawn that with the return of a brisk home demand they would gladly throw the goods back again into the home channels. But the developments that have arisen from the endeavor have given to the project a degree of certainty and of permanence that the manufacturers themselves did not anticipate. They expected to sell mainly the 26 inch goods, which are two inches narrower than the American make, and to manufacture which would involve very little change in their machinery. They are now selling these goods and receiving as high a price as the 28 inch goods bring in this country, while the cost of making is much less. The wider styles of print cloths so much in vogue in England, the 32, 34 and 36 inch goods, they did not expect to sell. But the English buyers offered such desirable prices for these goods that the manufacturers decided to make such changes in their machinery as would furnish a steady supply. But larger orders have been received and are yet coming forward, and several corporations are now placing their mills largely on this kind of cloth.

## Special Notices.

## A. PURVES &amp; SON,

Corner South & Penn Streets, Phila., Dealers in

Scrap Iron & Metals, Machinery, Tools, Shaving & Pulleys, Steam Engines, Pumps & Rollers, Copper, Brass, Tin, Rabbit Metals, Foundry Facings. Best Quality Ingot Brass. Cash paid for all kinds of Metals and Tools.

## DROP FORGINGS.

The TRENTON VISE & TOOL WORKS, Trenton, N. J., having increased their facilities, are now able to do all kinds of

Iron and Steel Drop Forgings in quantities to order at reasonable rates.

HERMANN BOKER & CO., Proprietors, 101 & 103 Duane St., N. Y.

## Special Notices.

## WANTED TO PURCHASE.

The most improved Horse Nail Machinery. Parties manufacturing the same will please

Address, P. Y.,

Office of *The Iron Age*, 10 Warren St., N. Y.

## CENTENNIAL EXHIBITION.

A young man, a native of this city, with good references, having had large experience in the Hardware Trade, offers his services in receiving, arranging and keeping goods in order during the exhibition. Terms moderate. Address,

JOSEPH K. PARKER, 461 North 2nd Street, Philadelphia.

## ROLLING MILL SUPERINTENDENT

## Wanted.

A competent man, who can take an interest in a mill running on specialties in one of the most promising towns of the West. Address, W., Office of *The Iron Age*, 10 Warren St., N. Y.

THE UNDERSIGNED have this day formed a Co-partnership under the firm name and style of DANIEL W. RICHARDS & CO., for the purpose of transacting an importing and general Iron and Metal business, 88 to 104 Manhat Street, DANIEL W. RICHARDS, MORTON B. SMITH, EDWARD HILL, New York, March 1, 1876.

## IMPORTANT Hardware Auction Notice.

On Three Months Credit.

The entire stock of

HARDWARE, CUTLERY, &c.

of the

SCHWEITZER MFG. CO.,

Who are retiring from business, will be

SOLD AT AUCTION,

At No. 57 Reade Street, N. Y.

By BISSELL, WELLES & MILLET,

Commencing,

Tuesday, March 14, and continued until the

ENTIRE STOCK is disposed of.

This will be the largest sale of Hardware ever made in the United States, the inventory of which on Jan. 1 was over \$76,000. There will be from 3000 to 4000 lots, making a catalogue of 150 to 200 pages. The lines of goods are large, new and staple. It is impossible in an advertisement like this to enumerate the different classes of goods, their variety being so great. For the convenience of those who desire it we will forward a list and quantities of the leading goods that are to be sold.

The Sale is Peremptory.

Catalogues will be issued as early as possible.

TERMS OF SALE.

All bills over \$500 a credit of three months will be given for approved paper, with interest added at the rate of seven per cent. per annum; under \$500, cash.

BISSELL, WELLES & MILLET,

Auctioneers, 15 Murray St., N. Y.

MANUFACTURERS OF HEAVY AND SHELF Hardware or House Furnishing Goods, desiring to have the sale of their productions pushed in the city of New York and vicinity, will learn of an opportunity by communicating with

BOX 14,

Office of *The Iron Age*, 10 Warren St., N. Y.

## TO LET—THE WORKS OF THE

## CHICAGO

## Plate and Bar Mill Co.,

INCLUDING

GALVANIZING WORKS,

the whole complete and ready for operation. Only works in the State, or west of Cleveland, making Boiler Plate, Sheet and Galvanized Metals. Large trade established. Address

J. M. AYER,

Care J. Y. Ayer & Sons, Chicago, Ill.

## HARDWARE.

FOR SALE in the best business part of Jersey City, a first-class Tool and Hardware business. Established about 25 years, and doing a fair business.

Apply to H. LUTGEN,

57 Montgomery St., Jersey City.

## Partner Wanted,

In large Iron Property. Charcoal Furnace and Forge Works leased for \$12,000 per annum, quarterly payments. Room for other works. Make best quality metal. Address

P. O. Box 863, Baltimore, Md.

## To Manufacturers and Patentees.

Wanted useful patented articles for manufacture, suitable for sale by hardware dealers. Cash will be paid for patents or advance made for royalty.

Address, P. P. PRATT,

Care PRATT & CO., Buffalo, N. Y.

## DISCOUNT LISTS.

Hinges 1 Stanley Works' list... 10¢ to 30¢ each, 75¢ and 100¢. 1 Union Mfg Co's... 10¢ to 60¢. 75¢ Bolt, File and Hinge and Butt List... Contains all the lists and discounts that are used... Price \$1.00 Dayton & Lamberson, 97 Chambers St., N. Y.

## Worcester Free Institute.

APPRENTICE CLASS,

Enter January 29. Address,

Prof. C. O. THOMPSON,

Worcester, Mass.

## HARDWARE SPECIALTIES

Manufactured to order on favorable terms.

POWER AND ROOM to Rent by the

CORRUGATED METAL CO., East Berlin, C.

## Special Notices.

## SPECIAL NOTICE.

I have three patents for Dies, Machinery, and Tools for making Augers and Bits, each running seventeen years; dated as follows: Dec. 19, 1865; January 31, 1866; and July 3, 1866. There is a special claim on each of the Dies. All persons infringing on said patents will be held responsible to the extent of the law. Russell Jennings, DEER RIVER, Conn., Sept. 7, 1874.

## WANTED TO PURCHASE,

100 tons good Second-Hand T

Rails, 18 or 20 lbs. per yard.

Address, giving particulars,

PIPER & THOMPSON,

Lapeer, Mich.

## TO LET,

A Light, Handsome Office.

Possession Immediately.

HERMANN BOKER & CO.,

101 Duane Street, N. Y.

## MANUFACTURERS

desirous of introducing their goods to the British and Continental Markets, are advised to insert advertisements in the newspaper "IRON," published every Saturday, at 99 Cannon Street, London, E. C.

Scale: First 3 lines, 8¢; every additional line, 10¢. Price, 6¢ per Copy, or 30¢ per annum, inclusive of postage to the United States.

## HALL &amp; HARBESON,

Manufacturers of

Chemical & Physical Instruments,

191 Greenwich Street, N. Y.

SPECIALTY.—BURNER'S GAS BURNERS, for all heating purposes; BURNER'S IMPROVED GAS CONDENSER; FURNACES, with 15 and 25 burners. Fine Brass and Metal Work made to order for Metallurgists, Chemists, Experimenters, Colleges, &c.

## Steel Castings.

Solid and Homogeneous. Guaranteed tensile strength, 25 tons to square inch. An invaluable substitute for expensive forgings, or for Cast Iron requiring great strength. Send for circular and price list to

CHESTER STEEL CASTINGS CO.,

Evansville, Ind., Philadelphia, Pa.

## Wanted—A Partner,

In a foundry and machine business, already well established. Locality splendid and healthy.

A practical man with means is wanted to join a practical man who is already well established.

Address CAR WHEEL FOUNDRY,

P. O. Box 134, Selma, Alabama.

## Briesen's Patent Agency

FOR SECURING INVENTIONS, TRADE

MARKS, &c., IN AMERICA

AND EUROPE.

No. 258 Broadway, New York.

A. V. BRIESEN.

## WANTED.—Situation as salesman in a manufactory

of Hardware of any description. Twelve years' experience traveling in the West.

Address W. C. THAYER,

Wood's Hotel,

116 & 118 Fifth Ave., Chicago, Ill.

## WANTED.—A first-class business man familiar

with machinery and manufacturing, capable of handling large bodies of men, desires a responsible position. References satisfactory. Address,

IRON AND STEEL,

Care of P. O. Box 813, Bridgeport, Conn.

## Business Opportunities.

New Capital Procured, Partnerships

Arranged, and Commercial, Mining

and Banking Corporations Or-

ganized, by

CLARKE, CHITTY & CLARKE,

Board of Trade Offices, New York.

P. O. BOX, 4071.

## NOTICE! POND'S TOOLS.

The undersigned has assumed the Personal Property, including account, finished and unfinished Machinery, good will &c., connected with the manufacture of MACHINERY'S TOOLS as conducted by Mr. Lucius W. Pond since 1847, and will continue the said business at the old stand, cor. Union and Exchange Sts., Worcester, Mass., under the name of David W. Pond, Successor to Lucius W. Pond.

CARD.—Having assumed the business mentioned above, I solicit Inquiry and Patronage, with guarantee that present standard of Workmanship, and quality of Machinery shall be maintained. A large quantity of New and Second-Hand TOOLS, ALL SIZES AND SIZES, For Sale at Low Prices. Send for list of second-hand tools. Store at 98 Liberty St., New York, will be discontinued from Feb. 1, 1876, and all sales made from manufactory.

Respectfully,

DAVID W. POND,

Successor to LUCIUS W. POND.

## DISSOLUTION OF COPARTNERSHIP

The firm of McClernan & Hynes is this day dissolved by mutual consent. The business of the firm will be liquidated by M. McClernan alone, No. 130 Liberty Street.

NEW YORK, Jan. 20, 1876. M. McCLERNAN,

D. HYNES.

## For Sale, &amp;c.

Mortgage Sale of Charcoal Furnaces, also 1700 tons of charcoal pig metal, good car wheel and Bessemer pig iron, according to grades (1, 2, 3 & 4) to be sold at auction, March 7th, 1876, 10 o'clock, a. m., on premises, at Fort Leavenworth Co., New York. The property consists of 1 stack, 9 feet high, one in complete working order; will make 10 tons each per day. Water power (about 800 horse), 18 acres in furnace lot in fee (on which are furnaces, tanks and machinery houses, coal sheds, office building, large boarding house for laborers, and four other houses for families; also large mine of magnetic ore on same plot; also, 600 acres of wood land in fee, hardwood on 30.00 acres adjoining land, 50 cents an acre royalty. Charcoal iron can be made at these furnaces now for \$25 or less a ton. Large quantities of iron made by these furnaces have been sold to and used by leading car wheel and other manufacturers with perfect satisfaction. Your attention is particularly called to the sale of both furnaces, pig iron and materials, 25,000 bushels of charcoal, tools, &c. The furnace could be put in blast in 30 days. The Union and Black River Railroad and Black River Canal pass within a few hundred yards of the furnace. The iron will be sold in lots to suit purchasers.

T. H. WAGSTAFF,

Sec'y of Black River Iron and Mining Co.,

61 Broadway, N. Y., Room 33.

## HARDWARE STORE, FOR SALE.

Is one of two stores situated in a city of seven thousand inhabitants, three railroads, fine country surrounding. Best of reasons for selling. For further information, address, KING & SON,

Lima, Allen Co., Ohio.

## For Sale.

## BLACK WALNUT

## For Sale Cheap.

Large quantities of pieces of plank suitable for turning and sawing into any article requiring such wood.

Perfectly Dry and Sound.

PROVIDENCE TOOL CO.,

Providence, R. I.

## FOR SALE.

Hardware, Tin and Stove business, in one of the best towns in Michigan. Can be bought on easy terms. Address, Box 165,

South Bay City, Mich.

## OLD RAILS WANTED.

Three to five hundred tons Old Iron T Rails, 50 to 60 lbs. per yard, at twenty (20) dollars the gross ton, delivered at an eastern port, subject to commission of 25¢ per ton, cash on delivery, after April 1. Address with particulars, RAILS, Box 2333, N. Y. P. O.

## FOR SALE.

## Valuable Iron Property.

The Rolling Mill, Nail Factory, Blast Furnace, Ores, Lands, &c., of the Hollidaysburg and Gap Iron Works, formerly known as the Juniata Iron Co., at Hollidaysburg, Blair County, Pa., are offered for sale separately or as a whole. Terms easy. If not sold or otherwise disposed of prior, the entire property will be offered at Public Sale at the American House, in Hollidaysburg, Wednesday, March 15, 1876, 11 o'clock A. M.

No more desirable property in the market. For further information, address,

A. K. BELL, President,

Hollidaysburg, Pa.

FEBRUARY 7, 1876.

## AT FURNACE SITE,

On the 25d Mar. 1876, at 12 o'clock, Noon.

## FOR SALE at Public Auction

## The Napanock Blast Furnace Property.

Description of the furnace is about as follows: Height of stack 46 feet high, and 12 feet bosh, built of stone to top of bosh, thence up of brick banded with heavy iron; lining is of fire brick 30 inches thick. Hearth and bosh are of fire brick. Tunnel head is 6 feet diameter. Hot blast was erected by Mr. McElroy, of Reading, Pa.; is first-class, almost new. The power is of water, said to be of double the capacity; one of the best water powers in the State. Wheel is overshot, 36 feet diameter 6 1/2 feet face. Capacity of furnace 30 tons Anthracite iron or 15 tons of charcoal iron. Woodland is abundant, from \$3 to \$5 per acre, for many years. Ores by railroad or by Delaware and Hudson Canal, which passes Napanock, which is a thriving place, two miles from Ellenville, Ulster Co., New York.

For further particulars, apply at furnace or to

H. BANGE,

94 Gold Street, New York City.

## FOR SALE.

## TESTING MACHINE, built by the South

Boston Iron Co., arranged for tensile and compressive strains, capacity 100 tons.

## MILLING MACHINE, built by Bradner

Milling Machine Co., cutters swing 28 inches diameter, and spindle set at right angles, which insures accurate work.

## IRON ROOF, that covers New England Iron



# Trade Report.

Office of the Iron Age,  
WEDNESDAY EVENING, March 1, 1876.

During the past week there has been a fall in off in speculative activity, but the market has been strong for all kinds of investment shares, and legitimate business of all kinds has been good. Money continues abundant, and borrowers on call have been accommodated at 3 @ 4 per cent. The rate of discount on prime business paper is 4½ @ 6 per cent. The bank statement contained no surprises, and indicated only the usual changes. The following is a comparison of the aggregate averages for the past two weeks:

	Feb. 19.	Feb. 26.	Differences.
Loans.....	\$383,011,400	\$384,800,000	Inc. \$1,788,600
Specie.....	22,044,900	20,700,000	Dec. 1,344,900
Legal tend.....	4,967,800	49,013,100	Inc. 44,045,300
Deposits.....	294,762,300	294,337,400	Dec. 424,900
Circulation.....	17,133,100	17,022,000	Dec. 111,100

The gold market has been strong, and the premium has been well maintained in the neighborhood of 114.

The following table shows the daily range of the premium since our last report:

	Highest.	Lowest.
Thursday.....	113½	113½
Friday.....	114	113½
Saturday.....	114	113½
Sunday.....	114	113½
Monday.....	114	113½
Tuesday.....	114	113½
Wednesday.....	114	113½

The market for government bonds has been unsettled by the passage by the Senate of the bill authorizing an increase of \$500,000,000 in the 4½ per cent. funding bonds, and extending the date of their maturity, so as to give them thirty years to run. This caused them to decline in value, as it was supposed that the five-twentieths of '65 and '67 would soon be called. When it was understood, however, that they would not probably be called for several years, the market recovered. Railroad mortgages are strong and in active demand for investment, but most other investment securities, including state bonds, are dull. We give below the closing quotations of governments.

The stock market has been heavy and dull, with a steadily downward tendency. Such transactions as have been reported were chiefly in Western Union, Lake Shore, Pacific Mail, Erie, St. Paul and Northwest. We give below the quotations of active shares at the close of business to-day.

The movements in foreign trade for the week are shown by the following tables:

For the week ended Feb. 26:

	1874.	1875.	1876.
Total for week.....	\$9,972,300	\$9,658,700	\$8,078,878
Prev. reported.....	52,070,609	46,341,363	48,666,006
Since Jan 1.....	\$62,042,909	\$56,000,053	\$53,764,888

Among the imports of general merchandise were articles valued as follows:

	Quant.	Value.
Amvils.....	63	\$642
Brass goods.....	14	994
Bronzes.....	15	2,090
Chains and anchors.....	87	1,651
Copper.....	4,511	\$1,309
Cutlery.....	14	2,732
Gun.....	4	4,314
Hardware.....	14	4,314
Iron, pig, tons.....	900	2,548
Iron, cotton tin.....	144	97,605
Iron, other, tons.....	250	384
Iron ore, tons.....	61	8,574
Metal goods.....	16	8,371
Needles.....	3	300
Per. caps.....	3	677
Shedlery.....	61	9,444
Steel.....	2	1,075
Silverware.....	21,527	133,390
Tin, boxes.....	141,014	34,668
Tin, 1023 slabs.....	283	2,770
Wire.....		

EXPORTS OF SPECIE.

For the week ended Feb. 26:

	Total for the week.....	Previously reported.....
	\$13,991	\$57,467

Total since Jan. 1, 1876.....\$771,458  
Same time in 1875.....\$331,328  
Same time in 1874.....\$91,072  
Same time in 1873.....\$191,719  
Same time in 1872.....\$74,604

Government bonds at the close were strong at the following quotations:

	Bid.	Asked.
U. S. Currency 6s.....	127	127½
U. S. 6s 1881, reg.....	123	123½
U. S. 6s 1881, con.....	123½	124
U. S. 5-20 1865, reg.....	117½	118
U. S. 5-20 1865, new reg.....	117½	118
U. S. 5-20 1865, con.....	119½	119½
U. S. 5-20 1867, reg.....	121½	122
U. S. 5-20 1867, con.....	121½	122
U. S. 5-20 1868, reg.....	121½	122
U. S. 5-20 1868, con.....	121½	122
U. S. 5-20 1869, con.....	123½	124
U. S. 10-40 reg.....	118½	119
U. S. 10-40 con.....	118½	119
U. S. 6s 1881, reg.....	118½	119
U. S. 6s 1881, con.....	118½	119

The following are the closing quotations of active stocks:

	Bid.	Asked.
Atlantic & Pacific R. R. Preferred.....	90	90½
Atlantic & Pacific Telegraph.....	49	49½
Chicago & Northwestern.....	63½	64
Chicago, Rock Island and Pacific.....	110	110½
Chic. & Quincy.....	118½	119
Col. & Ind. C. & Ind.....	54	54½
Cleveland and Pittsburgh.....	93½	94
Chicago & Alton.....	101	101½
Consolidation Coal.....	44½	45
Canton.....	42	42½
Del. Lack. and Western.....	117½	118
Delaware & Hudson Canal.....	120	120½
Adams Express.....	62½	63
American Express.....	73½	74
United States Express.....	73½	74
Wells, Fargo & Co. Express.....	87	87½
Harlem.....	142	142½
Hannibal & St. Joseph.....	18½	19
Illinois Central.....	101½	102
Kansas Pacific.....	12	12½
Kansas & Texas.....	12½	13
Lake Shore.....	60½	61
Michigan Central.....	60	60½
Pacific of Missouri.....	42	42½
Mariposa.....	7½	7½
New York Central.....	115½	116
New Jersey Central.....	107½	108
Ohio & Mississippi.....	30½	31
Pacific Mail.....	20½	21
Panama.....	155	156
Pittsburgh & Fort Wayne.....	102½	103
Pacific of Missouri.....	124	124½
Quicksilver.....	18½	19
St. L. Kan. City Northern.....	23½	24
St. L. Kan. City Northern.....	30	30½
Tol. Wabash & Western.....	34	34½
Union Pacific.....	66	66½
Western Union Telegraph.....	69½	70

## GENERAL HARDWARE.

There is little, if any, improvement to notice in the volume of business. There are some large buyers in the city, but we do not hear of any orders of much magnitude being placed. The changes in values which have occurred during the week are few.

In Foreign Hardware there is little doing, and prices continue at previous quotations.

Nails are in light demand, and are quoted at \$2.85 net, for 10d. In lots a concession of from 5 to 10 cents per keg could be obtained, according to quantity and brand.

Roy & Co., Troy, N. Y., have established an office in this city. In their announcement to the trade, under date of 15th ult., they say: "Having found it necessary, for the convenience of our customers, to carry a stock of goods in New York, we have this date established a warehouse at No. 78 Chambers street, which will be in charge of Messrs. A. Field & Sons. Orders received will be filled promptly from stock or sent to the factory, as occasion may require."

The following explains itself:  
OFFICE OF WRIGHT & CO.,  
Sole Owners and Manufacturers of  
WRIGHT'S PATENT TIN SIEVE,  
67 WASHINGTON ST., CHICAGO, Feb. 29, 1876.

TO THE TRADE.  
GENTLEMEN: In answer to the charge made a few days since by Graham & Haines, through the columns of *The Iron Age*, we beg leave to say that the charge is false, and further, that we are manufacturing our Sieves in large quantities, and filling all orders on short notice, and at a less figure than metallic Sieves have ever been sold; and we further agree to protect any and everybody that handles our goods against any prosecution by any competitors; and, further, we expect in a short time to stop R. J. Mann & Co. from double scanning their Sieve bottoms, inasmuch as that improvement is our invention. An application is now filed for it. Soliciting your orders, we are yours, very truly,  
WRIGHT & CO.

Fernald & Sise, No. 100 Chambers street, are agents for Wright & Co.'s Sieves in this city. The manufacturers of cordage have issued a revised price list under date of 23d ultimo. Sisal Rope has been reduced half a cent. per lb., Manila and New Zealand Cordage is unchanged.

Wallace & Sons, No. 89 Chambers and 71 Reade streets, have issued, under date of 1st instant, an illustrated catalogue and price list of the goods of their manufacture. Among their new goods we notice an increased assortment of fancy Stair Rods, Brass Hand Lamps, Hurricane Lanterns, &c. The following is their discount sheet:

WALLACE AND SONS' DISCOUNTS.	
March 1, 1876. Subject to change without notice.	
Brass, Rolled and in Sheets.....	net
" Copper and German Silver Wire.....	net
" Rods.....	net
" Copper German Silver and Zinc Tubing.....	net
" Butt Hinges.....	net
" Ferrules.....	10%
" Kettles.....	net
" Door Rail.....	net
" Strainer Cloth.....	net
" Escutcheon Pins.....	20%
Iron.....	net
Brass Jack Chain.....	40% to 50%
" Tacks.....	50% to 10%
" Silvered.....	50% to 10%
" Bolt Studs.....	30%
" Baxter's Wrenches.....	30%
" Braziers' Sheathing and Bolt Copper.....	net
" Cartridges, Rim-Fire.....	50%
" Target.....	50%
" Central Fire.....	30%
" Copper Rivets and Burs.....	30%
" Braziers' Rivets.....	10%
" Tacks.....	10%
" Nails.....	10%
" Bottoms.....	net
" Soldering Irons.....	net
" Dog Collars.....	net
" German Silver Market Metal.....	net
" Hurricane Lanterns.....	10%
" Hand Lamps.....	30%
" Union Bracket Burners.....	30%
" Plainished Brass and Copper.....	30%
" Percussion Caps.....	net
" Silver Plated Metal.....	net
" Stair Plates.....	30%
" Stair Rods, Common Oval.....	40%
" Fancy Patterns.....	30%
" Wire Cloth, No. 2 to No. 12.....	30% to 5%
" No. 12 to No. 100.....	30% to 5%

The Columbus Curry Comb Mfg. Co., of Columbus, Ohio, have established an agency for their goods in this city with Horace Durrie & Co., No. 97 Chambers street. They manufacture a strong, well made Trowel Shank Curry Comb in a variety of patterns, both close and open back. These goods are well known in the West, and we are informed that they are offered at a price that will compete satisfactorily with any similar goods in the market. In their advertisement on the 10th page they present an illustration of one of their leading patterns. They say of these goods: "Our Combs are made with extra heavy Trowel Shanks, every Comb warranted. They are not full jewelled, do not infringe upon the rights of any of those manufacturers of new fangled ideas more beautiful in theory than in practice, but we do present a common sense Curry Comb that every hostler in the country can use successfully without undergoing a course of instruction as to the grasping device, &c., &c."

The Ausable Horse Nail Co. have begun to point and polish their "Clinton" Nail, which makes a very handsome appearance. They are listed 2 cents above the common "Clinton" Nail, making them, we are informed, the cheapest pointed and polished Horse Nail in the market.

The Douglass Mfg. Co., 62 Reade street, P. O. Box 2610, invite the attention of the Hardware trade to the illustrations of the goods of their manufacture, to be seen in their advertisements on pages 16 and 17.

The Norway Iron Bolt manufacturers held an adjourned meeting in Philadelphia on the 24th ultimo, at which the price of Carriage and Tire Bolts were considerably advanced. The meeting, which was largely attended, was very harmonious and their action unanimous.

The accompanying List of Square and Hexagon Nuts, Washers, Machine Bolts, Forged Set Screws and Tap Bolts, Wood or Lag Screws, Bolt Ends and Turn Buckles, was adopted Feb. 9th by the Association, to take effect March 1st, 1876.

Regarding the discount, there is no combination among the makers. In our price current, on another page, the discounts quoted for these goods in this market will be found.

## Manufacturers' Standard List of Square Nuts.

Short Diam.	Thick- ness.	Hole.	Size of Bolt.	New List Pri c. per Pound.
$\frac{3}{8}$	$\frac{5}{16}$	7-32	$\frac{3}{8}$	20
$\frac{3}{8}$	$\frac{5}{16}$	9-32	$\frac{3}{8}$	17
$\frac{3}{8}$	$\frac{5}{16}$	11-32	$\frac{3}{8}$	15
$\frac{7}{8}$	$\frac{7}{16}$	13-32	$\frac{7}{16}$	18½
$\frac{7}{8}$	$\frac{7}{16}$	7-16	$\frac{7}{16}$	
1	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	19
1½	$\frac{7}{8}$	9-16	9-16	
1½	$\frac{7}{8}$	$\frac{7}{8}$	$\frac{7}{8}$	11½
1½	$\frac{7}{8}$	9-16	$\frac{7}{8}$	
1½	$\frac{7}{8}$	11-32	$\frac{7}{8}$	11
1½	$\frac{7}{8}$	21-32	$\frac{7}{8}$	
1½	$\frac{7}{8}$	25-32	$\frac{7}{8}$	
1½	$\frac{7}{8}$	27-32	$\frac{7}{8}$	
2	1	$\frac{7}{8}$	1	
2	1	15-16	1½	
2½	1½	15-16	1½	
2½	1½	1-16	1½	
2½	1½	1-16	1½	
2½	1½	1-16	1½	
3	1½	1-16	1½	13
3½	1½	7-16	1½	
3½	1½	1-16	1½	14
3½	2	1-16	1½	
4	2	1-16	2	



**FRANCE.**  
(*Montieur des Interets Metalari.*)

PARIS, Feb. 13, 1876.—*Metal.*—Extreme quiet is all the characteristic of the general Metal markets in Europe. This paralysis is greatly increased by the pressure to the political and financial uncertainties which surround us, and furthermore to the consequences the many large failures in England and elsewhere which took place last year; to which there were added the tremendous losses sustained by the enormous depreciation in Turkish, Spanish and South American funds. Operators of all sorts, including those in the Metal trade, have been to a great extent crippled, and the speculative element has been much impaired in its own capacity as much as in the rest of Europe, notwithstanding the fact that in France the general movement of imports and exports has been steadily rising. In 1850 this movement did not exceed 3,907,000,000 francs; in 1865 it was 50,000,000; in 1869, 8,500,000; in 1870, 10,000,000, and in 1874, 7,425,000,000. Another subject which tends to check larger operations in France is the rapid depreciation of silver so largely in circulation amongst us; this depreciation, measured by the old standard, is now about 5 per cent, but it is apprehended that gradually it will reach 15 and even 30 per cent; due on the one hand to increased production in Nevada and elsewhere, and on the other to adoption of the gold standard in Germany and now countries beyond—France, Belgium, and the Netherlands on the West Coast with unusually heavy barres, which, in the dull state of affairs to which have alluded, has the effect of discouraging some large holders, who now watch every opportunity of getting out of the metal, and who, in consequence of any demand, the market is languishing at its center, and we nominally quote: Chili Bars, 212-50; France, the 100 kilos: Common ditto, 210-00; Choice ditto, 211-00; and the 50 kilos: Ingots, 220; English Tongue Cakes, 217-50; the Corcoran's 215; and the 250 lbs. 216-00. In silver, where first brand Bars are quoted 211-50 to 2150; good current ditto, 208-75 to 210; and Lots d'Urmettes, 206-25 to 207-50. Marsailles remains



steady; Tokat at 210; small Ingots, 215; Sheeth-  
ing, 210; and Yellow Metal ditto, 210 to 215. In Tin  
a dull and dragging market has been brought about,  
by the ample supply that is coming forward, both  
from the Straits and Australia, calculated to more  
than counteract any deliveries that are likely to be  
made during the current month. The attempt to  
screw up the market here has proved abortive, and  
we are now following in the wake of the general  
decline. We quote Banca here or at Havre, 227 1/2;  
Straits, 215; and English at Havre or Rouen, 210.  
Marseilles is quiescent and weak, Straits at 215, and  
Bilbao, 210. Lead has given way in the English  
market, with more doing thereat; while here we are  
weak and inactive at 56 50 for Spanish and French,  
and 57, English. Soft at Havre is 56 to 56 50. Mar-  
seilles is also less active, with some trade done in  
Soft at 54 50. The Continental Spelter markets are  
now higher than the English ones, and London is de-  
cidedly dull even at the difference. We are less  
firm here, and quote Silesian, deliverable at Havre,  
60 50; other good brands there, 48; and here 58 50.  
Marseilles is unaltered. Iron.—There is no improve-  
ment in the situation in France; at the North no  
orders are received leaving any profit to the maker,  
and the highest that principal Iron Manufacturers  
is 175 francs. In the Champagne moulage is quite  
inactive, and rests on 175. Affinage can hardly be  
quoted, some sell at 90 to 95 francs, others hold out  
for 65 to 70. Coal.—At the North and in the Pas-de-  
Calais extraction is proceeding with a good deal of  
steadiness, orders are quite abundant, producers  
being quite willing to meet the market. Half grey  
sells at 17 to 18 francs.

## BELGIUM.

(Revue Universelle).  
BRUXELLES, Feb. 12, 1876.—Iron.—Matters have come  
to such a pass in Belgian Iron industry that a peti-  
tion to the Minister of Public Works has been drawn  
up and signed by the principal Iron masters and en-  
gineers, requesting him to order at home Rail and  
railroad material to the amount of some 25,000,000  
to 30,000,000 francs for the State lines, which sum  
would represent 134 freight cars and 17,000 tons of  
rails. Should the government accede to these  
wishes, the possible wants of these lines would be  
covered for four years to come, and of course the  
general situation would be much improved. One of  
the arguments used in favor of this plan is to the ef-  
fect that prices of everything pertaining to this  
branch are at present so much depressed that the  
government can hardly fail to make a good invest-  
ment in thus buying what it will require for the next  
four years. We beg to remark, however, that it is  
asking a great deal to induce the government to en-  
gage in this vast speculation, and lock up a large  
amount of the public funds for the sake of helping  
a branch of industry, for who tells us that a pro-  
longed stagnation may not bring down values to a  
still lower ebb? One thing may, nevertheless, be in-  
sisted upon with good reason in favor of the plan,  
and the government cannot deny it. Such of the  
State lines as are now conducted and stocked the  
railroad material which they possess is quite insuffi-  
cient, and its replenishment may be undertaken  
without further delay. Without going quite to the  
extent of what is proposed, the government will  
thus be able to materially improve the situation.  
Coal.—In 1865 Belgium produced 11,800,000 tons of  
Coal, the amount extracted by every miner employed  
being, on an average, 144 tons, at 1 50 francs per ton.  
In 1874 there were extracted 14,669,000, each miner  
producing 184 tons, at 2 30 per ton. Orders are not  
plentiful, but our companies are, nevertheless, quite  
busy in making up for the deficiency that resulted  
while the strikes partially interrupted work. The  
weather has become colder again, and there is a good  
demand for domestic wants.

## GERMANY.

(Borrenthal).  
HAMBURG, Feb. 12, 1876.—Metals.—What little im-  
provement there may be in the demand for metals  
manifests itself slowly, and we shall have to wait for  
genuine spring weather ere much activity can be ex-  
pected. The long and severe winter has been delay-  
ing a resumption of traffic in the more northern  
portion of our country very much. Where there has  
been no impediment consumption has shown a good  
deal of activity, and in such localities prices have  
been rather looking up. Copper is on the whole  
steady; Berlin quotes English and Australian 99 50  
to 92 marks the 50 kilos; at Stettin the quotation is  
99. Here we are, Best Selected, 57; Minnesota,  
110; and Quincy, 98. Tin is, as usual, weak, but  
quotations have nevertheless been maintained at all  
points. Lead is irregular, Berlin has remained firm,  
but here prices as quoted in our last report are up-  
held with some difficulty. Spelter as usual is weak,  
at Berlin, good to best brands Silesian command  
25 to 26 marks. At Breslau nothing has transpired,  
but the nominal quotations remain as they were.  
We are firm here, but quiet for the want of an avail-  
able supply.

## HOLLAND.

(Koch & Verboom).  
ROTTERDAM, Feb. 10, 1876.—Tin.—The govern-  
ment is generally blamed for the attempt to force  
the Tin market at the last sale, and the effect has  
been to cause a suspension to re-act, in preference, to  
Bilbao Tin at the difference in price. Thus Banca  
is now nominal at 50 guilders, while Bilbao has  
moved off in large quantities at 47 1/2; at 47 we think  
it may now be obtained. The government has pub-  
lished its returns for the eleven months ending Jan-  
uary, enabling us to draw up the following table of the

EXPORT OF TIN FROM HOLLAND.			
Eleven Months.			
To	1875.	1874.	1873.
Germany.....	3,323	3,079	2,674
England.....	468	445	1,296
Belgium.....	1,548	1,473	1,027
France.....	398	400	463
Hamburg.....	846	781	223
The United States.....	43	32	393
Other countries.....	502	369	393
Total.....	6,868	6,179	5,981

## AUSTRALIA.

(Sydney Morning Herald).  
ADELAIDE, Jan. 3, 1876.—Copper.—During the year  
ending June 30, 1875, there were smelted at the Port  
Adelaide Works 742 tons of ore, against 6674 in the  
preceding year. At the Newcastle Works there  
were smelted 5344 tons. The Copper was 1928  
tons at Adelaide and 730 at Newcastle. The  
previous year Adelaide yielded altogether 3071.  
The actual shipments were: From Adelaide, 1285  
tons, against 1303, and from Newcastle 583, against  
1043, the sales 537, against 860 here, and 147,  
against 1 ton at Newcastle. During the four months  
of which we have full reports since there have been  
purchased 5440 tons of Ore, Regulus and Rough  
Copper. The operations for draining and develop-  
ing the Burra-Burra mine are being pushed forward  
with all activity. It is hoped that they will lead to  
valuable discoveries of ore. The mines in the far  
North are yielding but small quantities of ore, there  
being throughout that rich district quite a lull,  
pending the result of the South Australian  
government railway scheme. Should the railway be  
constructed, the whole of the North would wake  
into activity, and the works here would get large  
quantities of suitable ore. The Newcastle Works  
have had an abundant supply of coal.

## Our English Letter.

Review of the British Iron, Steel, Metal  
and Hardware Trades.

(From our Regular Correspondent.)

SHEFFIELD, ENG., Feb. 14, 1876.  
SHEFFIELD AND THE STATES.  
Much perturbation of mind and tribulation  
of spirit have, I hear from several quarters,  
been caused by the remarks attributed to the  
president of the Sheffield Chamber of Com-  
merce, a few weeks ago, on the subject of the  
Sheffield trades with America. The cable dis-  
patch published in your principal papers made  
it appear that Mr. Smith, the president of the  
local chamber, had lost all heart of grace, and  
utterly despair of Sheffield successes in your  
markets. If I remember rightly, I sent you an

accurate report of what really did pass on the  
occasion. Whether or not, at all events I  
recollect that what Mr. Smith really did say  
was that the United States markets were pass-  
ing from us, and that from one or other cause  
it was very unlikely that we should ever do the  
trade with them that we had at one time en-  
joyed. This, also, was the tenor of succeeding  
speeches on the subject. Now, taking all this  
for granted, and even supposing that the pre-  
sident had actually used the words attributed to  
him by the cable dispatch, I really don't see  
why the New York and Boston agents of Shef-  
field houses should be so greatly exercised as to  
pour forth their excited feelings in turgid let-  
ters to the newspapers of this town. I can un-  
derstand that they feel "putty consid'ble  
riled" at having the remarks just alluded to  
thrown in their teeth; yet I think it would be  
just a little more philosophical and business  
like to swallow the dose and—look out for or-  
ders.

## STEEL IN IRON RAILS.

This question is one of the most vital impor-  
tance, and as it comes to the fore, will, in all  
probability, prove to have in its full demon-  
stration the solution of more than one political  
economic difficulty. It is already quite clear that  
the days of iron rails are over. Neither price  
nor other recommendation can any longer in-  
duce engineers, or the companies which are  
their employers, to give preference to iron over  
Bessemer steel. The steel article not only lasts  
twice as long as its iron competitor, but is, as  
a matter of fact, the only rail which can be  
made use of in many sections of the lines  
where there is an incessant stream of traffic.  
Our railways are no longer what they were.  
They are becoming like unto beds of rivers,  
down which the flowing waters of trains,  
metaphorically speaking, are incessantly pass-  
ing. Hence iron rails are out of the question.  
The plate layers would be killed off faster than  
they are now—which is quite unnecessary—  
were the commoner rails used. Then, again,  
as to prices. What is the difference at the pre-  
sent time? Simply this: Iron rails are quoted,  
both in Cleveland and South Wales, at £6. 5/  
to £6. 10/ per ton, whereas, to my own knowl-  
edge, the Great Eastern Railway last week di-  
vided an order for 4000 tons of Bessemer steel  
rails between a Sheffield and a Lancashire  
house at £8 per ton. Iron rails cannot be  
cheaper than iron—steel rails almost inevit-  
ably will—and then? *Qui vivra verra.*

## SCOTCH PIG IRON.

The warrant market at Glasgow was very  
quiet during the whole of last week, and there  
was comparatively little business done. Warrant  
average from 61/6 to 61/9, but closed very  
quietly at 61/3, sellers—buyers somewhat less  
money. The shipments, too, were on a limited  
scale, the total for the week being 6328 tons  
only, as against 7548 tons in same week of last  
year. There is a corresponding weakness in  
makers' brands to note, and also a reduction in  
some of the transatlantic freight rates. Glas-  
gow to New York is now 2/6; Ardrossan to  
New York, 5/; Glasgow or Ardrossan to Bos-  
ton, 10/; to New Orleans 5/ and 6/ respec-  
tively; to Baltimore, 8/ from both places; to  
Philadelphia, 10/; to Providence 14/; and Glas-  
gow to San Francisco 27/6. Ballast pig iron is  
still 47/6 alongside. The stock in Connal &  
Co's stores is now 61,405 tons, a reduction of  
623 tons in the week.

## TRADES OF SHEFFIELD.

There has been little or no movement of any  
importance here during the past week. In no  
single department of the heavy iron or steel  
trades do I hear of there being any really ap-  
preciable revival of activity. An indication of  
this is furnished by the fact that the shares of  
the recently formed William Jessop & Company  
(Limited), with £10 each paid, are now quoted  
on the Sheffield Stock Exchange at 3 1/2 to 3 3/4  
discount. The concern, I should state, is one  
of the foremost in the trade, especially in re-  
spect of sheet steel for pen making. In steel  
rails, quotations appear to be rapidly descend-  
ing to a level at which all ordinary experience  
fails to make profitable. Only last week a case  
in point arose in which a contract for a com-  
paratively small lot of these rails was taken  
from a home railway company by a firm in this  
district at a price which can, under no circum-  
stances, be made to yield even a moderate work-  
ing profit; the figure, I was told, was not a  
great deal over £8 per ton. The pig iron cost  
£3. 12/6 to £3. 15/ at the producers' works—  
say £4 per ton delivered. Fuel may be put  
down at 8/ per ton for the "blowing," reheat-  
ing, hammering (or cogging) and rolling pro-  
cesses, and wages, in one way or other, will run  
up to a serious item, not to mention waste and  
miscellaneous. I am not pretending, of course, to  
speak of these things with the precise accuracy  
of a prime cost clerk, but do so merely to show  
how bare many branches of trade are and how  
desperate the struggle is.

The Parkgate Iron Company has just restarted  
3 other puddling furnaces, making a total of 27  
now in operation. The Nos. 2 and 3 plate mills  
were also recommenced on Monday, there being  
just now plenty of orders for plates in the  
market. Some of the Parkgate men who had  
been out on strike have fallen in with their em-  
ployers' propositions and have resumed work.  
The leading Sheffield firms are doing pretty  
well in ship and boiler plates, not to mention  
the armor plate department. These last are so  
well employed that a short time ago, at one es-  
tablishment, one of the boiler plate mills was  
utilized for the purpose of turning out the  
lighter classes of armor plates. In merchant  
irons of ordinary brands there is very little be-  
ing done. Common bars are selling at a trifle  
under £8 per ton at the works, or £8. 2/6 de-  
livered in Manchester or Liverpool. Good or-  
dinary bars fetched £1 more money, and superior  
North Staffordshire, such as J. B., are £11 to  
£11. 5/ per ton.

Some of the local edge tool manufacturers  
are at present very well and satisfactorily en-  
gaged. In one case, that of a firm well known  
throughout the whole world for the uniform  
excellent quality of its productions, the work-  
men have permission to work as many hours as  
they think proper in excess of the ordinary  
day's labor; they are availing themselves of  
the chance to begin about 6 a. m. and cease at  
9 or 10 p. m. Sheep shears are amongst those  
cutting instruments which are now in best re-  
quest. They, with the other goods at present  
most sought after, are largely exported to the  
Cape of Good Hope, Australia, New Zealand  
and South America. Special articles for the  
West Indies are also selling very well.

Joseph Rodgers & Sons have declared a di-  
vidend of 1 1/2 per cent. against 15 per cent. last  
year. Cutlery remains very quiet.  
SOUTH STAFFORDSHIRE AND BIRMINGHAM.  
Pig iron is still accumulating in South  
Staffordshire, although nine-tenths of the  
furnaces of the district are out of blast. Pig  
iron, it is found, can be imported into the  
district at a cheaper rate than it  
can be produced in the immediate vicinity.  
On the Wolverhampton 'Change, on Wednes-  
day, there were plenty of sheets on offer at  
£11 to £11. 7 1/2, and good singles at £14 and up-  
ward. Many of the Birmingham hardware in-  
dustries are becoming deeply depressed, par-  
ticularly the gun, jewelry and iron tube trades.  
At some of the local engineering establish-  
ments there is more work on hand, chiefly in  
respect of constructive iron work. The makers

of hollow ware and edge tools are still very  
well engaged, as also are the producers of the  
cut nails and rivets.

## REDUCTION IN TIN PLATES.

Messrs. Baldwin have reduced the prices of  
their charcoal tin plates by 2 per box, leaving,  
I. C. Charcoal is 11 1/2; Weldon, 30; Unicorn,  
23 1/2; Arley, 28; and Stone coke, unsorted,  
29 per box—all at the works. The coke brands  
are in the main unchanged.

## SOUTH WALES.

From South Wales it is reported that the tin  
plate trade is bad, and that the men's wages  
are to be reduced 7 1/2 per cent., next month.  
Offers are being made for good coke plates for  
Liverpool at 19/6 per box, or 17/9 at the works,  
or at least 2/ less than the actual cost of pro-  
duction. Germany is said to be successfully  
competing with the Welsh makers in the tin  
plate trade, the difference in the cost of labor  
being greatly in favor of Germany. Coke bars  
made at Aberdare Valley Works are quoted at  
£8. 5/. At several works the wages of puddlers  
and mill men are being lowered 7 1/2 per cent.  
The only exports of iron last week were two  
small cargoes of rails, respectively to Salonica  
and Naples. Last week 47 steamers and 85 sail-  
ing vessels cleared from Cardiff with coal, of a  
total of 65,976 tons. The iron clearances  
above referred to only totalled 2715 tons, and  
were from Cardiff. No work is yet being done  
at Plymouth Iron Works.

## THE METAL MARKETS.

The London metal markets opened very  
quietly on Monday last, and all quotations were  
lower with very little business doing. On  
Tuesday prices were again easier, with but very  
few actual sales. On Wednesday little altera-  
tion occurred, but on Thursday iron was a  
trifle steadier; 20 tons Straits, £75, spot; and  
10 tons Australian, £77. On Friday the  
market was quiet.

There is no quotable change in Liverpool  
metal or iron prices.

Through Trains from Boston to Wash-  
ington.

The announcement that an arrangement had  
been completed between the New York & Bos-  
ton Railroad and the Pennsylvania Railroad, by  
which passenger cars will be run through from  
Boston to Washington without change of cars,  
was made some days ago. The companies pro-  
pose to make connection between the Pennsylv-  
ania Railroad depot and the Port Morris  
branch of the New York & New Haven Railroad  
at Mott Haven, by means of the steamer Mary-  
land, which is reported to be a very fast vessel.  
On the arrival of the express trains at Mott  
Haven the sleeping coaches will be run upon  
the Maryland to be transferred to the depot of  
the Pennsylvania Railroad at Jersey City. The  
railroad officials interested claim that this arrange-  
ment will enable passengers between Boston and  
Washington to save from twenty minutes  
to half an hour, and thus avoid the annoyance  
of a transfer in coaches across the island. All  
arrangements have been completed with a view  
of having the through cars run on or before  
the 1st of May. It seems, however, that the  
railroad officials have not calculated upon the  
opposition of the municipal authorities of this  
city, taking it for granted that they can make  
this detour of the island without the consent  
of the city. Members of the Common Council  
claim that this railroad movement, which is in-  
tended to be permanent, will injure New York,  
and hence they are opposed to it. They claim  
that under the Montgomery charter (section 37)  
all the waters surrounding the island of Man-  
hattan to high water mark are vested in the  
city, and that the corporations interested will  
be compelled to secure a ferry franchise before  
they can carry out the arrangement. The first  
opposition to the movement exhibited itself on  
Thursday last, when the Board of Aldermen  
passed a resolution calling upon Corporation  
Council Whitney for an opinion. It is likely  
that the companies interested will be compelled  
to pay a good round sum for the franchise be-  
fore they carry the scheme to a successful issue.

Always in Season.—There is never a time  
when somebody is not buying Fairbanks' Scales!  
We learn that, notwithstanding the general  
stagnation in business during the year  
just closed, no year has witnessed such a de-  
mand for Fairbanks' Scales. The fact is that  
they are an article of manufacture to which  
national importance attaches. Our business  
men all over the country have long since come  
to regard these scales as indispensable, and the  
endorsement of the United States government  
in the award of another contract for supplying  
thousands of post offices throughout the country  
with scales of Fairbanks' manufacture, gives  
a fresh emphasis to the character of the firm  
and the quality of their work. The Fair-  
banks standard is not only universally recog-  
nized here, but also throughout the world, and  
no special American manufacture holds a  
higher rank than the Fairbanks' Scale. With  
improved machinery of their own invention,  
and ample facilities for keeping pace with the  
increasing demand, an abundance of skilled  
labor and thorough management, the Messrs.  
Fairbanks enter upon the year 1876 with the  
prospect of a business that shall completely  
eclipse that of any preceding year in the history  
of the firm.—Chicago Tribune, Jan. 13th, 1876.

Moore's Pat. Triple Acting  
RATCHETS.  
DRILLS & WRENCHES.  
Good as the Best.  
Cheap as the Cheapest.  
Price \$3.00 to \$15.00.  
Foster's Combination  
BELT TOOL.  
IMPROVED HAND VISE,  
Patented Aug. 10, 1873.  
Send for lists and discounts to  
H. S. Manning & Co., New York.  
Winn & Campbell, Chicago.  
Howard, Tallman & Co., Philadelphia.  
Jackson & Tyler, Baltimore.  
Chas. Churchill & Co., London, Eng.  
Manufacturers' Agents,  
or to  
Lowell Wrench Co.,  
Worcester, Mass.

**THORN & NITSCHKE.**  
Manufacturers of  
Gasometer  
and  
Smoke Stack  
RIVETS.  
Bolts, Nuts, Lag Screws, Washers, &c.  
151 Centre Street, N. Y.

**KETTLE TIPPER  
AND  
STOVE LID LIFTER.**  
AMERICAN  
MANUFACTURING CO.  
NEW HAVEN,  
CONN.

**FAIRBANKS' SCALES**  
THE  
STANDARD,  
R. R. TRACK, HAY, COAL SCALES.  
For Miner's Use,  
Stores, Mills, Wharves,  
Elevators and Grain Warehouses.  
Also, Miles' Alarm Cash Drawer.  
Coffee and Drug Mills, Letter Presses, &c., &c.  
PRINCIPAL SCALE WAREHOUSES,  
FAIRBANKS & CO., 311 Broadway, N. Y.  
FAIRBANKS & CO., 166 Baltimore St., Baltimore, Md.  
FAIRBANKS & CO., 55 Canal St., New Orleans.  
FAIRBANKS & CO., 245 Main St., Buffalo, N. Y.  
FAIRBANKS & CO., 338 Broadway, Albany, N. Y.  
FAIRBANKS & CO., 408 St. Paul St., Montreal.  
FAIRBANKS & CO., 34 King William St., London, Eng.  
FAIRBANKS BROWN & CO., 2 Milk St., Boston, Mass.  
FAIRBANKS & EWING, Masonic Hall, Phila., Pa.  
FAIRBANKS, MORSE & CO., 132 Superior St., Cleve., O.  
FAIRBANKS, MORSE & CO., 139 Walnut St., Cin., O.  
FAIRBANKS, MORSE & CO., 48 Wood St., Pittsburgh.  
FAIRBANKS, MORSE & CO., 5th & Main St., Louisville.  
FAIRBANKS & CO., 30 & 34 Washington Av., St. Louis.  
FAIRBANKS & MONTGOMERY, San Francisco, Cal.

**E. & T. Fairbanks & Co.**  
ST. JOHNSBURY, VT.  
For sale by leading Hardware Dealers.  
**CROOK, HERRING & CO.,**  
Pattern and Model Makers,  
AND MACHINISTS,  
Corner Centre and White Sts., New York.  
Over Harlem R. R. Freight Depot (Room 8).  
We make a specialty of fine Machinery and Models for  
the Contests, Experimental and Patent Office Models.

John Toler, Joseph Ill, Francis J. Toler, Chas. H. Toler,  
**JOHN TOLER, SONS & CO.,**  
Manufacturers of  
Piano-Forte and Furniture  
**CASTERS,**  
108, 110, 112 and 114 Adams Street,  
Next to corner of Fer y, NEWARK, N. Y.

**BLAKE BROTHERS**  
HARDWARE CO.,  
New Haven, Conn.  
ESTABLISHED 1830.

Manufacturers of  
**BUILDERS' HARDWARE, BUTTS, HOUSE  
TRIMMINGS, CARRIAGE,  
And GENERAL HARDWARE**

The attention of our old Customers and the Trade generally is invited to our new  
Illustrated Catalogue just issued, comprising a full assortment of our well known  
staple goods: Butts (Drilled and Wire Jointed), Thumb Latches, Sash, Screw-up  
and Side Pulleys, Wardrobe and Harness Hooks, Draw Pulps, Nut Crackers, Cork Screws,  
&c., &c. Also several new and attractive styles of Fancy Hardware, at prices to  
suit the times.

Our new Patent Fancy Open Work Cap Butt, with Ornamented Knuckle, in Real  
and Imitation Bronze, and our Nickel Plated Cap Butts, with concealed Screws, are  
the handsomest in the market, and are attracting much attention. While making plain  
and japanned goods a specialty, we are prepared to meet the increasing demand for  
ornamented bronze and nickel plated House Trimmings. Goods packed in boxes or  
bundles, as may be preferred. For catalogue and price list address

**BLAKE BROTHERS HARDWARE CO.,**  
New Haven, Conn.

**PERFORATED METALS**  
**G. HAYES**  
71 EIGHTH AVE. N.Y.

**E. M. BOYNTON,**  
Manufacturer of  
**LIGHTNING  
CROSS CUT AND BUCK SAWS.**  
Warehouse, 80 Beekman St., N. Y.

SEND FOR MY NEW  
ILLUSTRATED CATALOGUE  
A. B. FARQUHAR  
Proprietor  
Penn's Agricultural Works,  
York, Penn'a.  
Manufacturers of Improved Standard  
Agricultural Implements  
A SPECIALTY.

**D. K. MILLER LOCK CO.**  
712 Cherry St., Philadelphia, Pa.  
Security, Durability, Convenience.

**IMPROVED SELF-LOCKING  
Brass Pad Locks.**  
Made in the most substantial and compact manner, and  
are in every respect a superior article. We guarantee  
that no two locks are alike, unless specially ordered.  
Each lock furnished with two keys. Any number of  
locks or keys made to order. Adopted by the United  
States Government. Samples of No. 1 Lock sent to all  
parts free, on receipt of \$1.50. Liberal Discounts  
to the Trade.

**CHASE MACHINE CO.,**  
Manufacturers of the  
**Chase Patent Governor,**  
Haskell's Patent Alarm Pump for Vessels  
AND  
**IMPROVED PUMP FOR LAND USE,**  
No. 36 Charlestown St., BOSTON.  
L. E. CHASE, Box 1655.

**CHAS. E. LITTLE, 59 Fulton St., N. Y.**  
Solid Cast Steel Pump Augers  
For Boring PUMP LOGS.  
All sizes in stock. Socket Shanks, Ring Han-  
dles, and Connecting Rods for the above to order.  
Also Tension Tools for joining log ends.

**JOHN TOLER, SONS & CO.,**  
Manufacturers of  
Piano-Forte and Furniture  
**CASTERS,**  
108, 110, 112 and 114 Adams Street,  
Next to corner of Fer y, NEWARK, N. Y.



# DOTY'S REVOLVING

TRADE MARK.

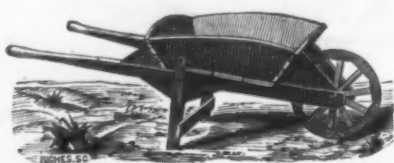


# ROAD SCRAPERS.

There are now in use in the United States and Canada **25,000 Scrapers** of our manufacture on Railroads, Turnpikes, Farms, and Canals, and the demand is still increasing. It is an indisputable fact that those who have ever used the Revolving Scraper never use any other afterwards. Experience proves them the **Best and Cheapest**.

**TRY THEM.**

## SELF-OILING WHEEL.



One and Coal Barrow No. 1.

with our patent Self-Oiling Wheel and Corner Locked Body, made from thoroughly seasoned hard timber, makes it the **Strongest and Cheapest** Barrow for the purpose in the market.

## DOTY'S MAMMOTH HARD PAN PLOW.

This is the largest plow made in the West. It is made from the best cast steel, and will stand the strength of ten horses.

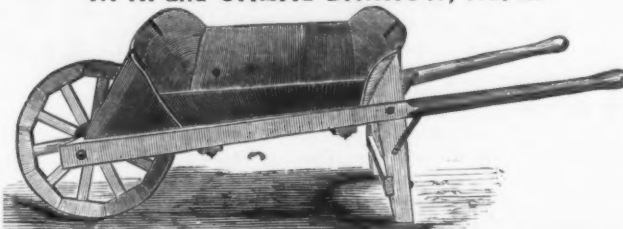
## AUTOMATIC



## SCRAPER.

Certificates from hundreds of Railroad and Canal Contractors prove that the DOTY Scraper is the **BEST**.

## R. R. and CANAL BARROW, No. 2.



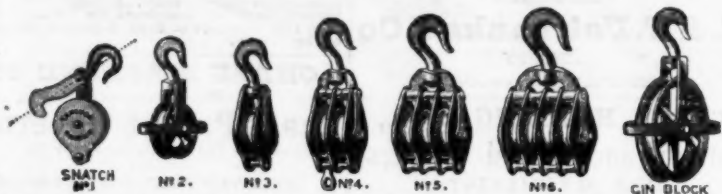
We offer this barrow to the trade with our patent self oiling wheel as the best barrow ever made for R. R. and Canal work.

**HAVE YOU SEEN IT?**

**WE WARRANT EVERY WHEEL.**

SEND FOR ILLUSTRATED CIRCULAR AND PRICES.

# REVOLVING SCRAPER CO., Room 5, Deshler Building, Columbus, O.



## Wrought Iron Tackle Blocks, FOR ROPE OR CHAIN.



Patent Self-Sustaining Rope Pulley Blocks. Same as the ordinary block, but suspends the weight at any point. Weston's Patent Differential Pulley Blocks. Made from 1/4 ton size to 10 tons.

**VAN WART & MCCOY, Sole Agents, 134 & 136 Duane St., N. Y.**

## THE BEST FARM BELLS.



Superior in tone and finish. Cast from the pure Crystal Metal. Satisfaction guaranteed. Lowest in price.

Circulars and price list free to the trade.

**C. S. BELL,**

HILLSBORO', OHIO.

## BAEDER, ADAMSON & CO., Manufacturers of SAND & EMERY PAPER & EMERY CLOTH.

Ground Emery, Corundum & Flint, Glue & Curled Hair, Hair Felt, & Felt-ing for Covering Boilers, Pipes, &c., Cow Hide Whips.

PHILADELPHIA, 730 Market St., NEW YORK, 67 Beekman St., BOSTON, 143 Milk St., CHICAGO, 152 Lake St.

## EMERY WELLINGTON MILLS.

**USE THE BEST.**

THE BEST IS ALWAYS THE CHEAPEST.



SALE AGENCIES:

Macomber, Bigelow & Dowse, Boston, Mass. Homer, Foote & Co., Springfield, Mass. C. Foster & Co., Worcester, Mass. J. Clark Wilson & Co., New York City. Chas. M. Ghiskey, Philadelphia, Pa. Belcher Bros., Providence, R. I. Baeder, Adamson & Co., Chicago, Ill. Baeder, Adamson & Co., Cincinnati, O. Clemens Vonnegut, Indianapolis, Ind. Geo. M. Way & Co., Hartford, Ct. F. S. Bradley & Co., New Haven, Ct. Apothecaries' Hall Co., Waterbury, Ct. W. Bingham & Co., Cleveland, O.

Sold by all Hardware Dealers

**BETTS & BURGER,** 95 Chambers Street, N. Y. Commission Merchants, And Dealers in Hardware and Cutlery Bargains. Solicit Agencies and Consignments.

THE EXCEL-SIOR DRY LEVEL.—Patented.



Works by gravity; warranted true; no glass to break; does not get out of order easily; graduated for degrees and feet and inches. Prices, \$1.50 to \$10, according to style and finish. For sale wholesale and retail by H. S. TARR & SON, 710 Green St., Phila.

## 1776. CENTENNIAL CURRY COMB. 1876.

They can be grasped by the handle directly over the top, or by the handle back of the comb, as commonly used.

THEY ARE THE

**Strongest and Most Durable Comb Made,** No Malleable Iron being used in their construction. **EVERY HANDLE WARRANTED KEYS ON.**

They have no Wire

Running through the bars to catch the

HAIR AND DIRT.

Catalogues furnished on application.

**SOLE AGENTS,**

**Wiebusch & Hilger Hardware Co.,** 84 & 86 Chambers Street, N. Y.



Manufactured by **Wm. P. Kellogg & Co.,** Troy, N. Y.

Patented May 4th and Dec. 21st, 1875.

## THE EMPIRE FAN BLOWING PORTABLE FORGES.

Patented in U. S. Nov. 25, 1873. Patented in Canada May 28, 1874.

**COSTING FROM \$16.00 TO \$75.00.**

We desire to call your attention to our new Forge, No. 12. They are especially convenient for Boiler Makers' repairs, weighing only 90 lbs.; they can be easily carried around the country, and will make a fire hot enough to melt 1/4 or 1 inch iron in two minutes. They are a very useful tool for Mechanists to set up on their work bench—always ready and handy for mending and tempering tools, and like work—and are so cheap that every mechanic can afford to complete his "kit of tools" by owning a Forge. We make 28 sizes of Portable Forge, designed for all purposes of metal working. Send for catalogue to

**EMPIRE PORTABLE FORGE CO., Troy, N. Y.**

## The Cowles Hardware Co., UNIONVILLE, CONN., Manufacturers of



**Hardware & House-Furnishing Goods.**

**GEO. DUNHAM, Pres.**

**G. S. KNAPP, Treas.**

**MARTIN COWLES, Sec.**

Screw Drivers of all varieties, Box Scrapers, Box Openers, Garden Hoes, Garden Trowels, Border Knives, Mining Knives, Fish Turners, Butter Knives, Cake Turners, Cleavers, Hammers, Carpet Stickers, Tack Claws, Marking Awls, Carpenters' Awls, Belt Awls, Ice Awls, Carriage Jacks, Nail Sets, Bush Hooks, Ice Axes, Ice Tongues, Patent Mouse Traps, Vegetable Slicers, Bit Braces, Butts and Spiral Springs, Ferrules, Ham Tryer, Ham Stringers, Oyster Knives, Cold Chisels, Handles, Solid and Prick Punches and

**IMPLEMENT SCREW DRIVERS.**

Catalogues and Circulars sent on application.





We wish to call the special attention of merchants to this

### PATENT BRACKET SAW FRAME.

We have never before made anything which sold so readily, and gave such universal satisfaction.



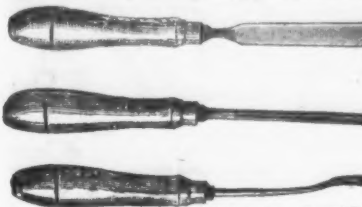
Where one is sold in a neighborhood, it makes a demand for many more. We have now sold 40,000 of them and have not yet heard one complaint, but we have a large number of letters expressing great satisfaction with them. We have advertised them largely and thereby created a demand in every part of the country.

The list price of Rosewood Frames is \$1.25 each, and of Birch \$1.00 each, with the same discount that we make on our Barber Bit Braces. Price of Saw Blades, \$1.20 per gross net.

We also make sets of

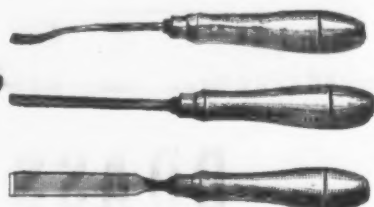
### CARVING TOOLS.

Price of the three tools in nice paper box \$1.00, discount 25 per cent. to the trade. These tools are sharpened and fitted for work. They are of superior quality, and sold at a lower price than imported tools.

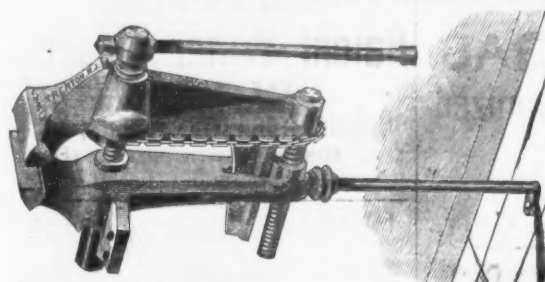


**Millers Falls Co.,**

No. 78 Beekman Street,  
NEW YORK.



### The New Double Screw Parallel "Leg" Vise.



We are now ready to furnish, as the result of more than thirty years' experience, our latest style of Vise—the best yet made. It is stronger than any other, whether of Foreign or of American make; always parallel and holding with a tighter "grip." The jaws are of convenient shape for the workman to get near his work equally well for filing or clipping. Instead of the heavy, clumsily formed jaws of the cast iron Single Screw Vises of the common "parallel" type, and which, depending upon slide alone for preserving parallelism, can never be screwed up very hard without "jamming" on the slides or breaking.

Our New Vise combines all the advantages of the "Peter Wright" Leg Vise, of strength and lightness, fastening to the floor and bench, and at the same time greatly superior to it: it is always perfectly parallel at all points of opening, and never gets out of line. Embodying the same general principle as the well known Chain Vise, so long made by us, we have by new, scientific proportioning of all the parts, and with our recently improved metals for their manufacture, obtained so perfect a tool, that we now warrant these Vises for three years from date of manufacture stamped upon each.

The jaws are of best Tool Cast Steel, welded on, file cut and properly hardened. The screws are forged of the best refined iron, and work in solid cut thread boxes.

The lower screw maintains the parallel position of the two jaws, by having exact motion with the upper working screw through the connecting chain which regulates it.

The chain is very accurately made of steel links and rivets, and having no strain of the work upon it, is therefore as durable as all the other parts.

Prices with Special Discounts to the Trade.

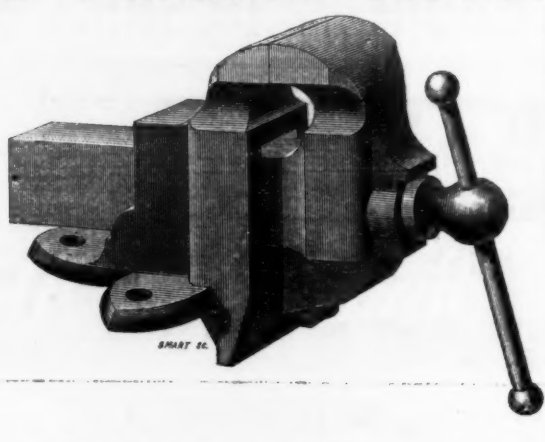
No. 1. Jaws	8 1/2 in. x 1 1/2 in.	Screws	3/4 in. diameter.	Lever	9 in. long.	Opens	4 1/2 in.	.....	\$8.00
" 2. "	4 1/2 in. x 1 in.	" 1 1/2 in.	" 1/2 in.	" 18 in.	"	" 5 1/2 in.	"	"	12.00
" 3. "	5 1/2 in. x 1 1/2 in.	" 1 1/2 in.	" 1 1/2 in.	" 18 in.	"	" 6 1/2 in.	"	"	17.00
" 4. "	6 1/2 in. x 1 1/2 in.	" 1 1/2 in.	" 1 1/2 in.	" 19 in.	"	" 7 1/2 in.	"	"	22.00
" 5. "	7 in. x 1 1/2 in.	" 1 1/2 in.	" 1 1/2 in.	" 24 in.	"	" 9 in.	"	"	30.00
" 6. "	8 in. x 1 1/2 in.	" 1 1/2 in.	" 1 1/2 in.	" 28 in.	"	" 10 in.	"	"	34.00

All sizes of these Vises furnished with Swivel Attachment, at an additional cost of \$1 to \$3. Sold at the General Agencies.

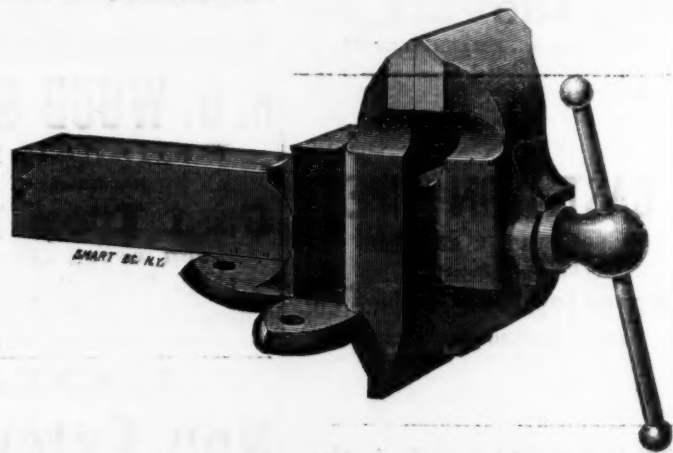
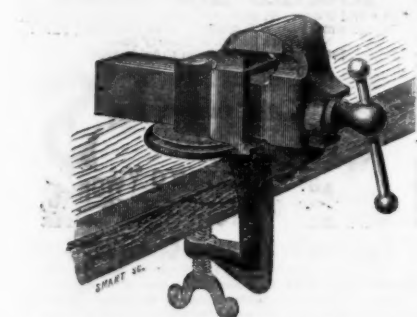
THESE GOODS ARE SOLD BY THE GENERAL AGENTS (with special discounts to the trade).

New York.—Messrs. J. CLARK WILSON & CO.—RUSSELL & ERWIN MFG. CO.—Messrs. HORACE DURRIE & CO. Boston.—Messrs. GEORGE H. GRAY & DANFORTH. Philadelphia.—Messrs. JAMES C. HAND & CO. Baltimore.—Mr. W. H. COLE. Louisville.—Messrs. W. B. BELKNAP & CO. FISHER & NORRIS, Sole Manufacturers, Trenton, N. J.

### Simpson's Adjustable Parallel Vises.



The jaws can be instantly opened or closed the full length, by one movement of the hand, without the use of the screw. They combine the QUICK ADJUSTMENT with all the advantages of the best Screw Vises, holding the work with as slight or firm a grip as may be desired, without any liability to jar or work loose, as is the case with other adjustable vises. The Screw being used merely to give the grip, they will outwear any Vises in market.

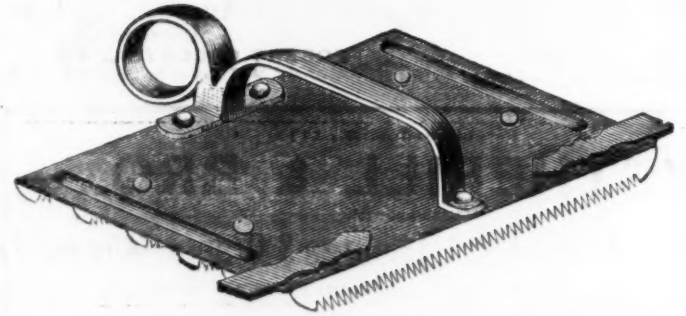
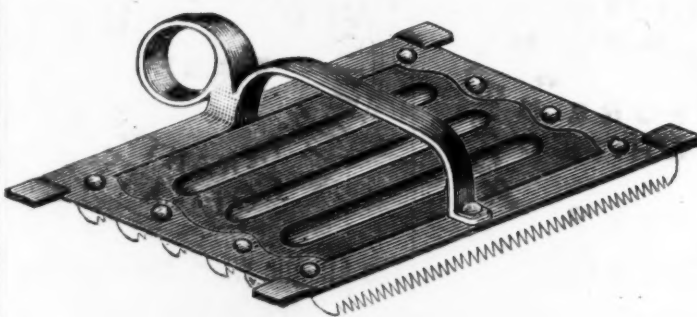
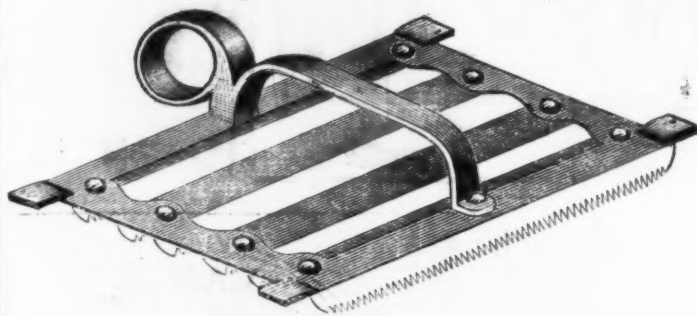
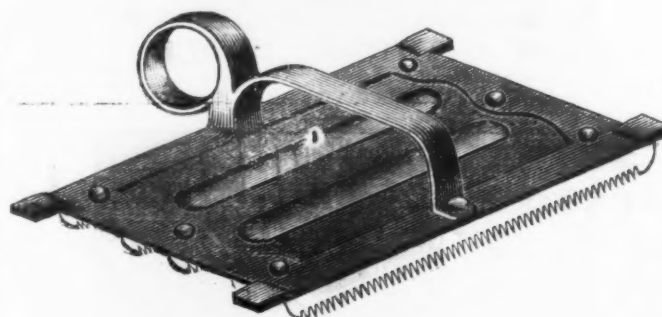
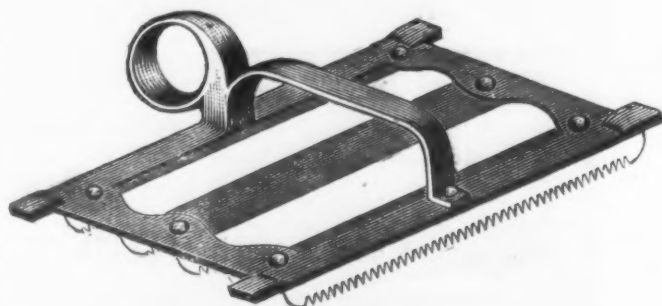
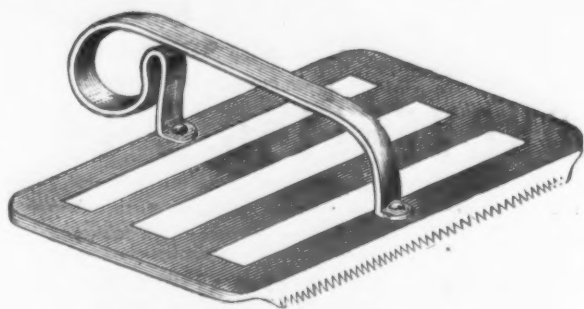


Their extreme simplicity constitutes one of their strongest recommendations.

Send for Price List.

BAILEY WRINGING MACHINE CO., Sole Agents, 106 Chambers Street, N. Y.

## HOTCHKISS NOVELTY COMB.



The Simplest, Neatest and most Durable CURRY COMB ever offered to the trade, affording an easy grasp for the hand, without the use of the ordinary side handle. Special Office and Sample Room with

Manufactured by  
**HOTCHKISS' SONS, Bridgeport, Conn.,**

### HOWARD PARALLEL BENCH VISE.

MANUFACTURED BY  
**Howard Iron Works,**  
Send for price list.  
**Buffalo, N. Y.**  
RUSSELL & ERWIN MFG. CO. NEW YORK & PHILADELPHIA AGENTS.



## Forehand &amp; Wadsworth's Double-Action



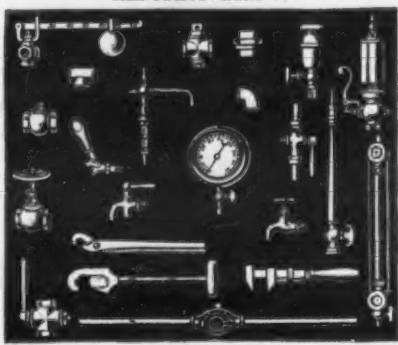
Manufacturers of Standard and O.K. Revolvers, Charles Daly Guns. Agents for Wesson & Harrington, J. P. Esbrough & Bro., Importers of Fine Gun Material, &c.  
Illustrated Catalogue furnished to only those whom we know to be in the trade.

**EATON, COLE & BURNHAM CO.,**

58 John Street, New York.

MANUFACTURERS OF

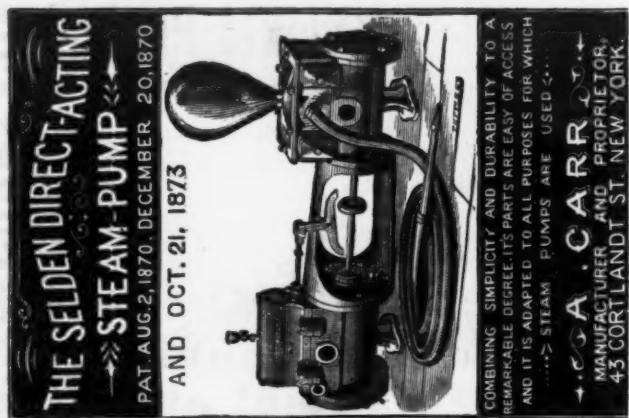
Wrought Iron  
**PIPE,**  
Cast Iron  
FLANGED PIPE,  
Cast Iron  
RADIATORS  
and BOILERS.



Brass & Iron  
**STEAM**  
Gas & Water  
**FITTINGS.**  
PLUMBERS'  
**MATERIALS.**

**STEAM GAUGES, TOOLS,**

and all Supplies used by Machinists, &amp;c.

**John T. Lewis & Bros.,**

No. 231 South Front St., PHILADELPHIA.



TRADE MARK.  
MANUFACTURERS OF  
PURE WHITE LEAD, RED LEAD,  
Litharge, Orange Mineral,  
Linseed Oil  
AND PAINTERS' COLORS.



The Atlantic White Lead and Linseed Oil Company,  
MANUFACTURERS OF  
White Lead (Atlantic), Red Lead,  
Litharge & Linseed Oil.  
**ROBERT COLGATE & CO.,**  
257 Pearl Street, New York.

Established A. D., 1777.

**WETHERILL & BRO.,**

Manufacturers of

White Lead, Red Lead, Litharge &amp; Orange Mineral.

Offices, 31st St. below Chestnut, PHILADELPHIA.

**Brooklyn White Lead Co.**

TRADE MARK.  
White Lead, Red Lead and  
Litharge.  
89 Maiden Lane, NEW YORK.  
FISHER HOWE, Trans.

**JOHN JEWETT & SONS,**

Manufacturers of the well known Brand of

**WHITE LEAD.**

TRADE MARK.  
Also Manufacturers of  
**LINSEED OIL**  
182 Front Street NEW YORK

## Pipe, Fittings, &amp;c.

**WROUGHT IRON  
INDESTRUCTIBLE ENAMELED PIPE**  
For Water, Gas, Sewage & Soil Pipe.

Manufactured Solely by

**NATIONAL TUBE WORKS CO.,**

Also Lap Welded Steam &amp; Gas Pipe &amp; Boiler Tubes.

Tubing & Casing for Artesian, Oil & Salt Wells (with Patent Protecting Coupling),  
A Specialty made of Large Wrought Iron Lap Welded Tubes, 8 in. to 14 in. diameter.  
**MACK'S PATENT INJECTOR, ETC.**

Works and Offices at BOSTON, MASS., and McKEESPORT, PENN.

OFFICES AND WAREHOUSES,

New York, 78 William Street.

Cincinnati, 119, 121 &amp; 123 Pearl Street.

Chicago, 112, 114 &amp; 116 Lake Street.

St. Louis, 811, 813, 816 N. Main Street.

**McNab & Harlin Mfg. Co.,**

MANUFACTURERS OF

**BRASS COCKS**

For STEAM, WATER and GAS.

Wrought Iron Pipe & Fittings, Plain and Galvanized  
**PLUMBERS' MATERIALS.**

Illustrated Catalogue sent by express to the Trade on application.

Factory, Paterson, N. J.

56 John Street, N. Y.



**WM. ESTERBROOK**  
Wholesale Manufacturer of  
**Coal Hods,**  
**FIRE SHOVELS, Etc.**  
311 Cherry St., PHILADELPHIA.

**CAST IRON PIPES**

FOR WATER AND GAS.

Branches Retorts, &amp;c.

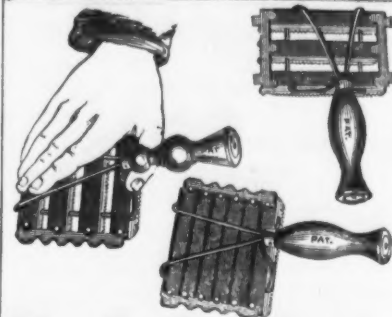
**Warren Foundry & Machine Co.,**  
PHILLIPSBURG NEW JERSEY.

**GEORGE BARNES & CO.,**

Manufacturers, Syracuse, N. Y.

**TRANSFER  
ORNAMENTS**

For Tin, Japan Ware, Safe and Carriage Manu-  
facturers, &c. For sale by  
**JULIUS FECHTELER, 104 John St., N. Y.**  
I sell my Carriage Ornaments to dealers only.

**The Perfect Comb.**

We call your attention specially to our new patent end-  
less wire frame comb. The result of a long series of ex-  
periments, made with a view to meeting all the require-  
ments of a Perfect Comb. It is better, stronger, and  
more durable than any ever before invented. The raised  
wire shank gives what has never before been attained,  
viz: a rest and brace for the thumb, in such a position  
that the hand cannot come in contact with the horse  
hair using the comb. The wire braces which run from  
the shank over the back to the front teeth give strength  
and durability in a direction never heretofore attained,  
and as the same time serve as an extra handle; and  
when clamped by the fingers in connection with the raised  
shank the comb is more firmly, easily, and completely  
held, and with much less fatigue to the hand than is  
possible in any other formation—in short, it needs but a  
trial to vindicate a name: **The Perfect Comb.**

**THE LAWRENCE COMB CO.**

Factory and Office,

382 2d Ave., cor. 23d St., N. Y.

**WM. S. CARR & CO.**

Sole Manufacturers of

**CARR'S****Patent Water Closets,****PUMPS,**

Cabinet Wood Work, Vases, &amp;c.

106, 108 &amp; 110 Centre Street,

Factory, Mott Haven, New York.

PAT. DEC. 23.73  
**BLAKEMORE'S GRAVITY DOOR ALARM**  
USE NO SPRING  
MANUFACTURED 3425 MARKET ST. PHILA.  
SEND FOR CIRCULAR

**EDWARD BARR,**

78 John Street, NEW YORK.

Tubes for Gas, Steam &amp; Water

1-16 to 48 inch. Gas, Steam Fitters', Plumbers'  
and Machinists' Supplies. Boiler Tubes, Iron and  
Steel Boiler Plates, Rivets, Tools, Etc. Railroad Cars  
and all kinds of Railway Supplies. Iron and Wood Work  
for Cars, Bridges and Buildings.  
Agent for W. C. ALLISON & SONS.

**J. AUSTIN & CO.,**

168 Fulton Street, N. Y.,

Proprietors and Manufacturers of

**WHEATCROFT'S SELF-ADJUSTING****Pipe Wrench,**

AND  
Scripture's Funnel Top  
**MACHINE OILERS.**

Dealers in

**STEAM AND GAS FITTERS TOOLS.**

**RIEHL BROTHERS,**  
Office and Works, N. 9th St., above Master, Phila.  
Warehouses, 50 & 52 N. 4th St., above Chestnut, Phila.  
New York Store, 36 Liberty Street.  
Pittsburgh Store, 48 Smithfield Street.



**'Patented' Furnace Charging Scale.**  
Double Beam R. R. Track Scale, Com-  
pound Parallel Crane Beams, &c. Patented  
First Power Lever Wagon Scales. Testing  
Machines and capacity.  
Send for Illustrated Price List.

**GOLD MEDAL****Non-Extensible Razor Belt.**

PATENTED JULY 25, 1871.

RE-ISSUED MAY 13, 1873, and JUNE 9, 1874.

In this Strap the liability of the leather to stretch and become loose and porous is prevented by the  
a patented non-extensible base, which supports the leather and secures

**PERMANENT ELASTICITY.**

We make this style with single rod, double rod, and wood frames, and intend that it shall, in quality  
compare favorably with our other well known brands.

**BENJAMIN F. BADGER & SON, Manufacturer,**

Badger Place, Charlestown, Mass.

**NEW HAVEN NUT CO.,**

MANUFACTURERS OF

**HOT PRESSED NUTS**

Of Superior Quality of all sizes, both

**HEXAGON & SQUARE,**

From 1/4 inch to and including 1 1/4 inch Bolt.

Factory and Office, - - - - - WESTVILLE, CONN



**The National**

guaranteed to clean better, last longer and work  
The CHALMERS SPENCE CO., Foot

**Redegard**

These superior Shoes  
well adapted to Western  
markets at freights as low

**THE TREDEGAR**

**TREDEGAR**

**SAMPLE**  
**Sole w**





**B. KREISCHER & SON,**  
**New York Fire Brick &**  
**STATEN ISLAND**  
**CLAY RETORT WORKS,**  
 Established 1845.

Office, 58 Goerck Street, cor. Delancy Street,  
 East River, New York.

The largest stock of Fire Brick of all shapes and  
 sizes on hand, and made to order at short notice.  
 Cupola Brick, for McKenna Patent,  
 and others. Fire Mortar, Ground Brick, Clay and  
 Sand. Superior Kaolin for Rolling Mills and Foundries.  
 Stone Ware and other Fire Clay and Sand  
 from my own mines at New Jersey and Staten Island  
 by the cargo or otherwise.

**Philadelphia Fire Brick**  
 AND

**Clay Retort Works,**  
**AND KENSINGTON FIRE BRICK WORKS**  
 Office, 324 and Vine, Philadelphia.

**PHILIP NEWKUMET,**  
 Successors to JOHN NEWKUMET, Proprietors  
 manufactures 9-inch Fire Bricks Tiles, and Blocks  
 for Rolling Mills, Blast Furnaces, Foundries, etc.  
 Works. Lime Kilns, Glass Houses, &c., &c.  
 Articles of every description made to order  
 short notice, and in a very superior manner.

"CLAY RETORTS FOR SUGAR BOILING."

**National Fire Brick & Drain Pipe Wks.,**  
 CHAS. ANNESS & SONS, Props.

Manufacturers of all shapes and sizes of  
**FIRE BRICK**  
 and Shippers of all kinds of **FIRE CLAY**.  
 Factory at SPA SPRINGS, on Perth  
 Amboy and Woodbridge, R. R.  
 Post Office address, Woodbridge, N. J.

Established 1845.

**WOODBIDGE, N. J.**  
**Fire Brick Works.**  
**WM. H. BERRY & CO.**

Manufacturers of all forms and sizes of **FIRE**  
**BRICKS**, for Blast Furnaces, Rolling Mills, Gas House  
 and Oven Tiles, and Stove Linings, made to order. Also  
 Fire Clay, Kaolin, Sand and Fire Mortar.

**Brick Presses,**

Oldest and Largest Establishment of the kind in the U. S.

**F. L. & D. R. CARNELL,**

1544 Germantown Avenue, Philadelphia.

Manufacturers of Pennsylvania Brick Machine  
 Little Giant Pipe Machine, Fire and Red Brick  
 Presses, Clay Wheels, Tile Machines, Stampers,  
 Grinding Pans. Brick Yards fitted out for running  
 by steam or horse. Heavy and Light Castings. Send  
 for circular.

**PERSEVERANCE**

**Iron Works & Machine Shop.**

**MARCUS SCHANTZ,**

Having established himself in the Iron and Machine  
 Business in Water St., Perth Amboy, is now pre-  
 pared to execute all orders in machinery, such as  
**STEAM ENGINES, BRICK MACHINES,**  
**BRICK PRESSSES AND TILING MACHINES.**  
 Also, Steam Fitting, and Iron and Brass Cast-  
 ings, &c., furnished in the shortest time, and in the best  
 and most workmanlike manner.

The Sugar Maker's Friend.

More agents wanted to can-

vas for the sale of Post's Pat-

ent Galvan-

ized Metallic

Spout and Bucket Hanger. Sam-

ple, Circulars and Terms sent on re-

ceipt of 25c. in pay postage. Address,

C. C. Post, Manufacturer & Patentee Burlington, VT.

**STEEL STAMPS.**

LETTERS, FIGURES, &c.,

Of every description and for all purposes.

Best Work. Lowest Prices.

**RICHARD H. ROGERS.**

45 Ann St., cor. (Rear), New York.

Orders by mail promptly attended to.

**NAME PUNCHES.**

**HOLSKE MACHINE CO.,**

279 Cherry St., near Jefferson St.

**ELEVATORS**

For Hotels & Stores a specialty.

Machinery in General made to order.

**BOOMER & BOSCHERT,**

Presses, Leather, Cloth, Paper,

Paraffine, &c.

B & B Press Co., Syracuse, N.Y.

or 26 Beekman St., New York City.

**PENNA. WAREHOUSING**

AND

**SAFE DEPOSIT CO.**

WAREHOUSES:

FRONT AND LOMBARD STREETS.

IRON STORAGE YARDS:

Port Richmond, Philada.; Reading, Pa.

Allentown, Pa.

NEGOTIABLE RECEIPTS ISSUED

OFFICE OF THE CO.

**N. W. cor. Third & Chestnut Sts**

OFFICERS:

THOS. L. JEWETT, President.

JAMES P. SCOTT, Secretary and Treasurer.

DIRECTORS: B. E. JAMISON, Vice-President.

J. M. COLLINGSWOOD, Gen'l Supt.

Henry Pemberton, Geo. W. Woodward,

Henry P. Sloan, J. H. Catherwood,

F. C. Hollis, D. A. Dangier,

J. T. Audenried.

**MINERS' CANDLES.**

superior to any other Light for Mining

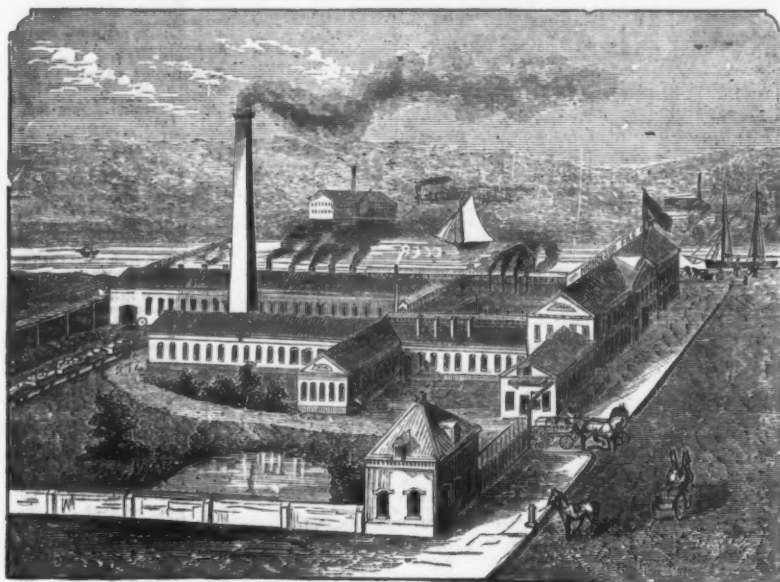
Purposes. Manufactured by

**JAMES BOYD'S SON,**

Nos. 10 & 12 Franklin St., N. Y.

**WOODLAND FIRE BRICK CO.,**  
**LIMITED.**

Manufacture **SUPERIOR**  
**FIRE BRICK,**  
 Especially adapted for Steel and Siemens Furnaces.  
**WOODLAND, CLEARFIELD CO., PA.**



**DEALERS AND CONSUMERS**  
**OF FILES**

SHOULD PURCHASE THE

**Nicholson or "Increment Cut" File**

FOR THE FOLLOWING REASONS:

- First.**—They are made from the best quality of File Steel.
- Second.**—Each File undergoes a careful inspection after each operation, by critical inspectors, and none but perfect work allowed to pass.
- Third.**—They are cut by the "Increment" or irregular cut, therefore combine the advantages of both Hand and Machine work.
- Fourth.**—They will finish finer than Files of any other make of same degree of coarseness.
- Fifth.**—They will not "pin" or scratch like hand-cut Files.
- Sixth.**—The "Increment cut" File, by our records, will remove more stock with a given number of pounds applied than any other File with which we are acquainted.
- Seventh.**—All Files under seven inches are put up in boxes of one dozen each, and neatly labeled.
- Eighth.**—The large stock carried by us, combined with our superior facilities, enables us to fill the largest orders at the shortest possible notice.
- Ninth.**—We are constantly making careful tests of our Files by delicately constructed machinery, which automatically records the actual power applied, forward, backward and downward, at each stroke of the File, also the number of strokes, combined with the work performed, enables us not only to judge of the quality of our Steel for wear, but also of the cutting qualities of the File, and the ease (expressed in pounds) with which a given amount of work can be accomplished.
- Finally.**—Our Files are warranted to be hard, well cut and sound. They are exclusively used by many of the largest Railroads and Machinists in the country—and the vigorous growth of our reputation, not only for making a good article, but of our ability to furnish a good article cheap, is evidenced by the large number of Dealers and Jobbers who are handling our Files exclusively.

**NICHOLSON FILE COMPANY, Providence, R. I.**

SOLD BY HARDWARE DEALERS GENERALLY.

**CROOKE & CO.,**

MANUFACTURERS OF

**WROUGHT IRON BUTTS,**

All our goods are manufactured from patent faced iron plates; they have a smooth face and bright finish.

163 & 165 Mulberry Street, New York.

FERNALD & SISE, Agents, 100 Chambers Street, N. Y.

**NEWTON & CO.,**

Successors to

**PALMER, NEWTON & CO.,**

ALBANY, N. Y., Manufacturers of

**FIRE BRICK**

**Stove Linings,**

**Range and Heater Linings**

Cylinder Brick, &c., &c.

**Watson Fire Brick Manufactory**

ESTABLISHED 1838.

**JOHN R. WATSON,** Perth Amboy, New Jersey.

Manufacturer of

**FIRE BRICK,**

For Rolling Mills, Blast Furnaces, Foundries,

Gas Works, Lime Kilns, Tanneries, Boiler

and Grate Setting, Glass Works, &c.

**FIRE CLAYS, FIRE SAND, AND KAOLIN FOR SALE.**

**A. HALL & SONS,** Perth Amboy, N. J.

ESTABLISHED 1848.

**HALL & SONS,** Buffalo, N. Y.

ESTABLISHED 1866.

**FIRE BRICK**

of reliable quality for all purposes, manufactured of the

best New Jersey Fire Clays. Also, ROCKINGHAM'S

WARE, YELLOW WARE, Fire Clay, Fire Sand, Kaolin

Ground Fire Brick, and Diamondine Building Brick.

**HENRY MAURER,**

Late of the firm of MAURER & WEBER.

Proprietor of the

**Excelsior Fire Brick & Clay**

Retort Works,

Sole Manufacturer of French Pat. Roofing Tiles

and Hollow Brick.

WORKS: PERTH AMBOY, NEW JERSEY.

Office & Depot: 415 to 422 East 23d St., bet. 1st

Ave. and Ave. A, New York.

**BROOKLYN CLAY RETORT**

AND

**Fire-Brick Works,**

Van Dyke Street, Brooklyn, N. Y.

E. D. White, Surviving Partner of the late firm of

J. R. Brick & Co.

**Manhattan Fire Brick & Enameled**

Clay Retort Works,

**ADAM WEBER, - - Proprietor.**

Office, 633 E. 15th St., N. Y. Clay Retorts, Ena-

maled for Gas Houses; Retorts for burning raw bone and

re-burning bone for Bone Black. Fire Bricks, Tiles,

Blocks, Cupola and Range Bricks of all shapes and sizes.

The best fire clay from my own Clay beds at Perth

Amboy, N. J.

**M. D. Valentine & Bro**

Manufacturers of

**FIRE BRICK**

**And Furnace Blocks.**

IN ALL ITS BRANCHES,

**Woodbridge, - - - N. J.**

**TROY STOVE LINING**

AND

**Fire-Brick Works.**

**BELL & BACON.**

Stove Linings a Specialty. TROY, N. Y.

JAS. C. BELL, JR. J. BLUNT BACON.

**The Union Stove Works,**

70 BECKMAN ST., N. Y.

Established 1830. Manufacturers of

**FURNACES, RANGES and STOVES,**

In great variety, suitable for all parts

of the world.

**SCHWEITZER MFG. CO.,**

57 Reade Street, New York.

Manufacturers, importers and dealers in foreign

and American Iron, Hardware, Cutlery, &c. Also

manufacturers' agents for Files and Tools. Solid

Cast Steel; Hammers and Sledges of all kinds, Rules,

Plows, Gauges, Plumbs and Levels, Boring Ma-

chines, Horse Brushes, &c.

JANUARY, 1876. J. A. SAXTON, Manager.

**COX & COX,**

**Counsellors at Law,**

229 Broadway, NEW YORK.

Practice in cases relating to

**PATENTS and**

**TRADE MARKS.**

Before the

Courts and Patent Office.

**A. H. SPENCER,**

**Solicitor of Patents,**

And Expert in Patent Cases.

28 State St., Room 10, Boston.

**HOWSONS'**

OFFICES FOR PROMOTING

UNITED STATES AND FOREIGN

**PATENTS,**

Forrest Buildings

119 SOUTH FOURTH ST., PHILADELPHIA,

AND MARBLE BUILDINGS

605 Seventh St. (Opposite U. S. Patent Office,

Washington, D. C.)

H. HOWSON, Solicitor of Patents, C. HOWSON,

Attorney at Law.

Communications should be addressed to the

PRINCIPAL OFFICES, PHILADELPHIA.

**FRANCIS C. NYE,**

**Counsellor at Law,**

13 Murray St., N. Y.

**PATENT CASES**

brought or defended in any district of the U. S.

**SOLICITS W. E. SIMMONS' PATENTS**

In the U. S. and abroad, with specialism to strength

and validity, and in shortest possible time. Pamph-

let free, 345 Main St., Hartford, Conn.

**PATENTS.**

**F. A. LEHMANN,**

Solicitor of American & Foreign Patents.

WASHINGTON, D. C.

No Patent, No Pay. Send for Circular.

**PATENTS.**

Thomas D. McLean,

No. 28 Murray St., N. Y.

Solicitor of Patents, and

Scientific Expert in pat-

ent cases.

Send for circular.

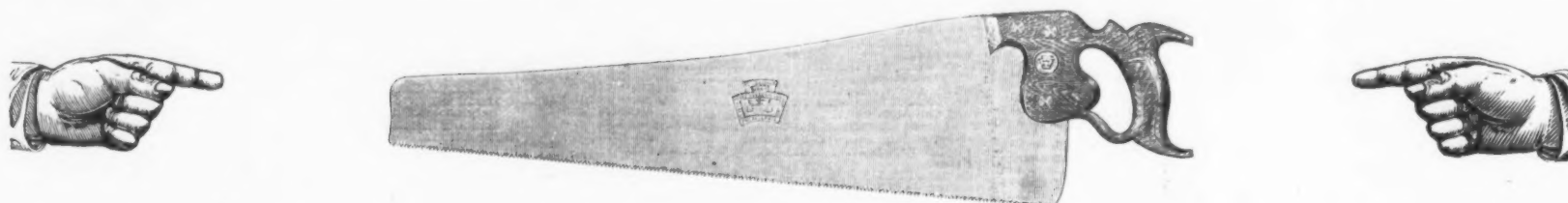


# Keystone Saw, Tool, Steel and File Works.

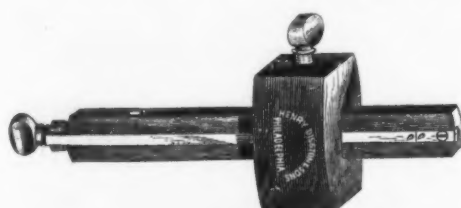
## HENRY DISSTON & SONS,

Front and Laurel Streets, Philadelphia.

### "CENTENNIAL No. 76."



This Saw is ground on the back, to taper gradually from butt to point, being only 26 gauge at the point. By this mode of grinding, the Saw, when tested, makes a complete "whip bend." The handle is apple-wood, oil finish, the screws are flush and polished, and the Saw is superior to any ever offered to the trade in this or any other country at the price. It is the sweetest-cutting, nicest-hanging Saw that can possibly be manufactured, feeling as light as a feather at the point, owing to its peculiar construction. The screws are finished before being put into the handle, and, should they become loose, can be readily tightened with an ordinary screw-driver, and still make a good finish.



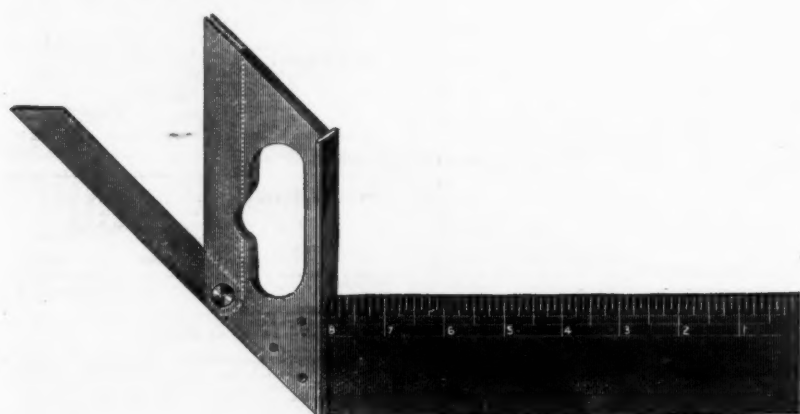
Gauge No. 91.



Gauge No. 93.



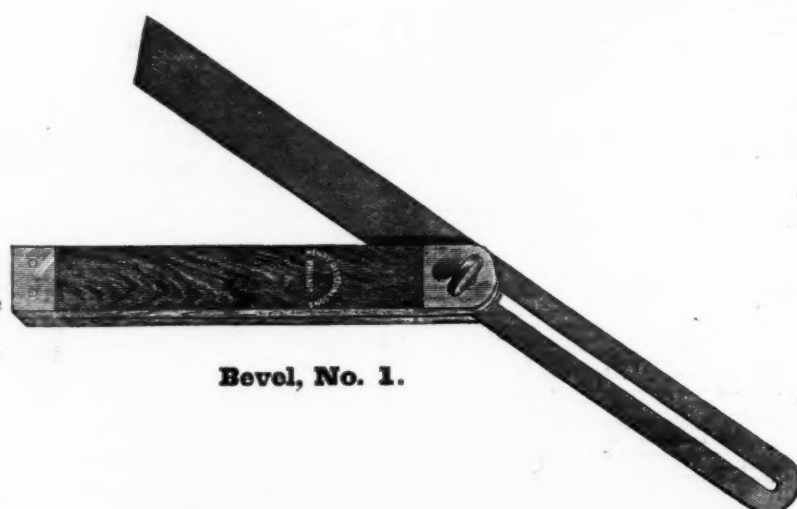
Gauge No. 96.



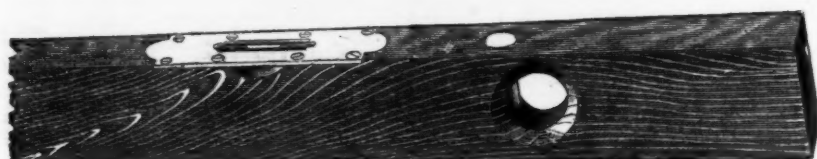
Improved Iron Frame Mitre and Square.



Bevel, No. 2.



Bevel, No. 1.



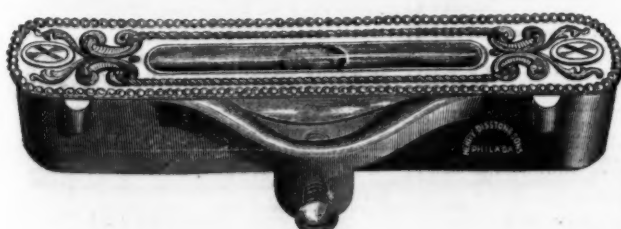
Plumb and Level, No. 102.



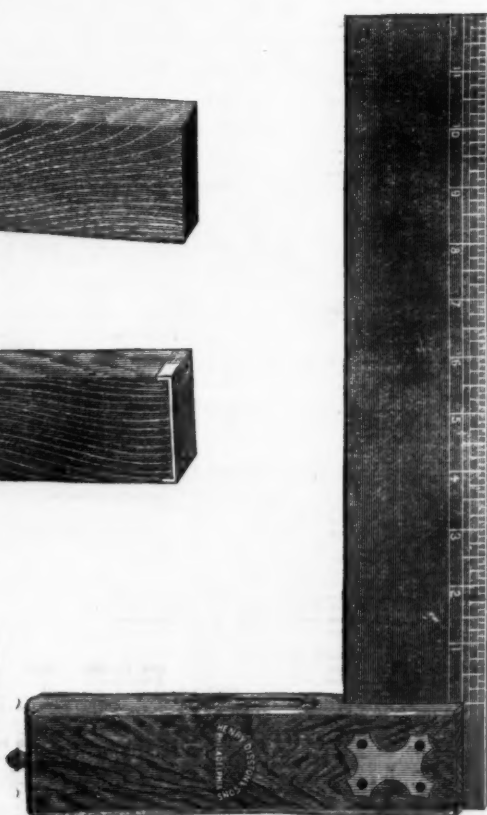
Plumb and Level, No. 104.



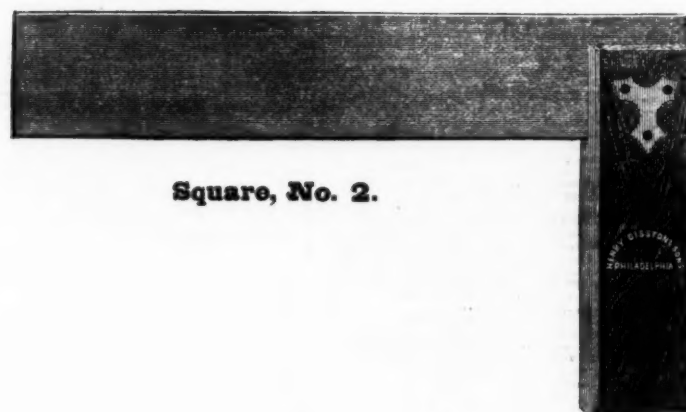
Plumb and Level, No. 106.



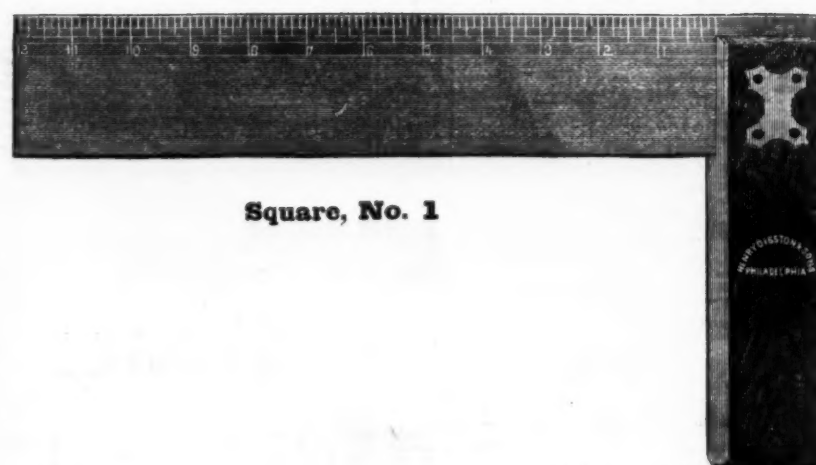
Pocket Level.



Combination Square, No. 4.



Square, No. 2.



Square, No. 1.



[illegible]



Sieves.—Mann's Patent.....	dis 35 @ 40
Iron.....	dis 35 @ 40
Plated.....	dis 35 @ 40
Wood Rim.....	dis 35 @ 40
Shears and Scissors.....	dis 35 @ 40
Cast Steel.....	dis 35 @ 40
Cast Iron.....	dis 35 @ 40
Leather Saws.....	dis 35 @ 40
Standard quality shears and Trim-	dis 35 @ 40
mers.....	dis 35 @ 40
Seymour's Straight Trimmers.....	dis 35 @ 40
Scissors.....	dis 35 @ 40
Pruning.....	dis 35 @ 40
Harvard's Lamp Trimmers.....	dis 35 @ 40
Sheaves.....	dis 35 @ 40
Sliding Door, M. W. & Co. list.....	dis 35 @ 40
" R. & E. list.....	dis 35 @ 40
" Patent Roller.....	dis 35 @ 40
" Russell's Anti-Friction.....	dis 35 @ 40
Sliding Shutter, R. & E. list.....	dis 35 @ 40
" Sargent's List.....	dis 35 @ 40
Shovels and Spades.....	dis 35 @ 40
Ames.....	dis 35 @ 40
Birmingham Shovel Co.....	dis 35 @ 40
Howard's.....	dis 35 @ 40
Old Colony.....	dis 35 @ 40
Modestor's Shovel Co.....	dis 35 @ 40
C. H. Jennings & Co.....	dis 35 @ 40
Dunning's Shovels and Scoops.....	dis 35 @ 40
Shovels and Tongs.....	dis 35 @ 40
Iron and Brass Head, R. & E. list.....	dis 35 @ 40
Polished Steel.....	dis 35 @ 40
Markets.....	dis 35 @ 40
Barnet & Berry's.....	dis 35 @ 40
N. Y. Club.....	dis 35 @ 40
All Clamps.....	dis 35 @ 40
Flange Steel.....	dis 35 @ 40
" Spring.....	dis 35 @ 40
" All Clamps.....	dis 35 @ 40
Peck & Sawyer.....	dis 35 @ 40
No. 1. Blued.....	dis 35 @ 40
No. 2. Nickel Plated.....	dis 35 @ 40
No. 3.....	dis 35 @ 40
Clippers Club Blued.....	dis 35 @ 40
" Full Ford.....	dis 35 @ 40
Plated.....	dis 35 @ 40
Acme Club Skates.....	dis 35 @ 40
Skates.....	dis 35 @ 40
Square Frames, Round Cornered, by case.....	dis 35 @ 40
Less than a case.....	dis 35 @ 40
Spoke Shaves.....	dis 35 @ 40
Iron.....	dis 35 @ 40
Wood.....	dis 35 @ 40
Balloy's.....	dis 35 @ 40
Spoke Shave Irons.....	dis 35 @ 40
Spear & Jackson's.....	dis 35 @ 40
Spoons.....	dis 35 @ 40
Turned Iron.....	dis 35 @ 40
By the case.....	dis 35 @ 40
Basting.....	dis 35 @ 40
Britannia.....	dis 35 @ 40
" Boardman's, new list.....	dis 35 @ 40
Rogers & Bro., A. I.....	dis 35 @ 40
Derry Silver Co.....	dis 35 @ 40
Holmes, Booth & Hayden.....	dis 35 @ 40
Nickel Silver Co.....	dis 35 @ 40
German Silver.....	dis 35 @ 40
Tin (P. S. & W.).....	dis 35 @ 40
Teas.....	dis 35 @ 40
Tableware.....	dis 35 @ 40
Stones and Dies.....	dis 35 @ 40
Hindstone.....	dis 35 @ 40
" Axe Stone.....	dis 35 @ 40
Silpa.....	dis 35 @ 40
Sand Stone.....	dis 35 @ 40
Whitish Stone.....	dis 35 @ 40
Arkansas Stone.....	dis 35 @ 40
Griststones, Family.....	dis 35 @ 40
" Loring's.....	dis 35 @ 40
Steve Polish.....	dis 35 @ 40
Joseph Lison's.....	dis 35 @ 40
Gem.....	dis 35 @ 40
Gold Metal.....	dis 35 @ 40
Rising Sun.....	dis 35 @ 40
Squares.....	dis 35 @ 40
Steel.....	dis 35 @ 40
Nickel Plated.....	dis 35 @ 40
Star Try Square.....	dis 35 @ 40
Diston's Try Square.....	dis 35 @ 40
No. 1.....	dis 35 @ 40
No. 2.....	dis 35 @ 40
No. 3.....	dis 35 @ 40
Tacks, Bra's & Co.—List of January 1, 1876.....	dis 35 @ 40
Tacks, Half Weight, American.....	dis 35 @ 40
" Full.....	dis 35 @ 40
" Half.....	dis 35 @ 40
" Full.....	dis 35 @ 40
" Carpet, Am. and Sweden.....	dis 35 @ 40
" Leather Head.....	dis 35 @ 40
" Copper.....	dis 35 @ 40
Brads, Half Weight.....	dis 35 @ 40
Shoe Nails.....	dis 35 @ 40
4-shs and longer, 3c, 3 1/2-shs, 3 1/2c, 5-shs, 4c, 6-shs, 4 1/2c, 7-shs, 5c, 8-shs, 5 1/2c, 9-shs, 6c, 10-shs, 6 1/2c, 11-shs, 7c, 12-shs, 7 1/2c, 13-shs, 8c, 14-shs, 8 1/2c, 15-shs, 9c, 16-shs, 9 1/2c, 17-shs, 10c, 18-shs, 10 1/2c, 19-shs, 11c, 20-shs, 11 1/2c, 21-shs, 12c, 22-shs, 12 1/2c, 23-shs, 13c, 24-shs, 13 1/2c, 25-shs, 14c, 26-shs, 14 1/2c, 27-shs, 15c, 28-shs, 15 1/2c, 29-shs, 16c, 30-shs, 16 1/2c, 31-shs, 17c, 32-shs, 17 1/2c, 33-shs, 18c, 34-shs, 18 1/2c, 35-shs, 19c, 36-shs, 19 1/2c, 37-shs, 20c, 38-shs, 20 1/2c, 39-shs, 21c, 40-shs, 21 1/2c, 41-shs, 22c, 42-shs, 22 1/2c, 43-shs, 23c, 44-shs, 23 1/2c, 45-shs, 24c, 46-shs, 24 1/2c, 47-shs, 25c, 48-shs, 25 1/2c, 49-shs, 26c, 50-shs, 26 1/2c, 51-shs, 27c, 52-shs, 27 1/2c, 53-shs, 28c, 54-shs, 28 1/2c, 55-shs, 29c, 56-shs, 29 1/2c, 57-shs, 30c, 58-shs, 30 1/2c, 59-shs, 31c, 60-shs, 31 1/2c, 61-shs, 32c, 62-shs, 32 1/2c, 63-shs, 33c, 64-shs, 33 1/2c, 65-shs, 34c, 66-shs, 34 1/2c, 67-shs, 35c, 68-shs, 35 1/2c, 69-shs, 36c, 70-shs, 36 1/2c, 71-shs, 37c, 72-shs, 37 1/2c, 73-shs, 38c, 74-shs, 38 1/2c, 75-shs, 39c, 76-shs, 39 1/2c, 77-shs, 40c, 78-shs, 40 1/2c, 79-shs, 41c, 80-shs, 41 1/2c, 81-shs, 42c, 82-shs, 42 1/2c, 83-shs, 43c, 84-shs, 43 1/2c, 85-shs, 44c, 86-shs, 44 1/2c, 87-shs, 45c, 88-shs, 45 1/2c, 89-shs, 46c, 90-shs, 46 1/2c, 91-shs, 47c, 92-shs, 47 1/2c, 93-shs, 48c, 94-shs, 48 1/2c, 95-shs, 49c, 96-shs, 49 1/2c, 97-shs, 50c, 98-shs, 50 1/2c, 99-shs, 51c, 100-shs, 51 1/2c, 101-shs, 52c, 102-shs, 52 1/2c, 103-shs, 53c, 104-shs, 53 1/2c, 105-shs, 54c, 106-shs, 54 1/2c, 107-shs, 55c, 108-shs, 55 1/2c, 109-shs, 56c, 110-shs, 56 1/2c, 111-shs, 57c, 112-shs, 57 1/2c, 113-shs, 58c, 114-shs, 58 1/2c, 115-shs, 59c, 116-shs, 59 1/2c, 117-shs, 60c, 118-shs, 60 1/2c, 119-shs, 61c, 120-shs, 61 1/2c, 121-shs, 62c, 122-shs, 62 1/2c, 123-shs, 63c, 124-shs, 63 1/2c, 125-shs, 64c, 126-shs, 64 1/2c, 127-shs, 65c, 128-shs, 65 1/2c, 129-shs, 66c, 130-shs, 66 1/2c, 131-shs, 67c, 132-shs, 67 1/2c, 133-shs, 68c, 134-shs, 68 1/2c, 135-shs, 69c, 136-shs, 69 1/2c, 137-shs, 70c, 138-shs, 70 1/2c, 139-shs, 71c, 140-shs, 71 1/2c, 141-shs, 72c, 142-shs, 72 1/2c, 143-shs, 73c, 144-shs, 73 1/2c, 145-shs, 74c, 146-shs, 74 1/2c, 147-shs, 75c, 148-shs, 75 1/2c, 149-shs, 76c, 150-shs, 76 1/2c, 151-shs, 77c, 152-shs, 77 1/2c, 153-shs, 78c, 154-shs, 78 1/2c, 155-shs, 79c, 156-shs, 79 1/2c, 157-shs, 80c, 158-shs, 80 1/2c, 159-shs, 81c, 160-shs, 81 1/2c, 161-shs, 82c, 162-shs, 82 1/2c, 163-shs, 83c, 164-shs, 83 1/2c, 165-shs, 84c, 166-shs, 84 1/2c, 167-shs, 85c, 168-shs, 85 1/2c, 169-shs, 86c, 170-shs, 86 1/2c, 171-shs, 87c, 172-shs, 87 1/2c, 173-shs, 88c, 174-shs, 88 1/2c, 175-shs, 89c, 176-shs, 89 1/2c, 177-shs, 90c, 178-shs, 90 1/2c, 179-shs, 91c, 180-shs, 91 1/2c, 181-shs, 92c, 182-shs, 92 1/2c, 183-shs, 93c, 184-shs, 93 1/2c, 185-shs, 94c, 186-shs, 94 1/2c, 187-shs, 95c, 188-shs, 95 1/2c, 189-shs, 96c, 190-shs, 96 1/2c, 191-shs, 97c, 192-shs, 97 1/2c, 193-shs, 98c, 194-shs, 98 1/2c, 195-shs, 99c, 196-shs, 99 1/2c, 197-shs, 100c, 198-shs, 100 1/2c, 199-shs, 101c, 200-shs, 101 1/2c, 201-shs, 102c, 202-shs, 102 1/2c, 203-shs, 103c, 204-shs, 103 1/2c, 205-shs, 104c, 206-shs, 104 1/2c, 207-shs, 105c, 208-shs, 105 1/2c, 209-shs, 106c, 210-shs, 106 1/2c, 211-shs, 107c, 212-shs, 107 1/2c, 213-shs, 108c, 214-shs, 108 1/2c, 215-shs, 109c, 216-shs, 109 1/2c, 217-shs, 110c, 218-shs, 110 1/2c, 219-shs, 111c, 220-shs, 111 1/2c, 221-shs, 112c, 222-shs, 112 1/2c, 223-shs, 113c, 224-shs, 113 1/2c, 225-shs, 114c, 226-shs, 114 1/2c, 227-shs, 115c, 228-shs, 115 1/2c, 229-shs, 116c, 230-shs, 116 1/2c, 231-shs, 117c, 232-shs, 117 1/2c, 233-shs, 118c, 234-shs, 118 1/2c, 235-shs, 119c, 236-shs, 119 1/2c, 237-shs, 120c, 238-shs, 120 1/2c, 239-shs, 121c, 240-shs, 121 1/2c, 241-shs, 122c, 242-shs, 122 1/2c, 243-shs, 123c, 244-shs, 123 1/2c, 245-shs, 124c, 246-shs, 124 1/2c, 247-shs, 125c, 248-shs, 125 1/2c, 249-shs, 126c, 250-shs, 126 1/2c, 251-shs, 127c, 252-shs, 127 1/2c, 253-shs, 128c, 254-shs, 128 1/2c, 255-shs, 129c, 256-shs, 129 1/2c, 257-shs, 130c, 258-shs, 130 1/2c, 259-shs, 131c, 260-shs, 131 1/2c, 261-shs, 132c, 262-shs, 132 1/2c, 263-shs, 133c, 264-shs, 133 1/2c, 265-shs, 134c, 266-shs, 134 1/2c, 267-shs, 135c, 268-shs, 135 1/2c, 269-shs, 136c, 270-shs, 136 1/2c, 271-shs, 137c, 272-shs, 137 1/2c, 273-shs, 138c, 274-shs, 138 1/2c, 275-shs, 139c, 276-shs, 139 1/2c, 277-shs, 140c, 278-shs, 140 1/2c, 279-shs, 141c, 280-shs, 141 1/2c, 281-shs, 142c, 282-shs, 142 1/2c, 283-shs, 143c, 284-shs, 143 1/2c, 285-shs, 144c, 286-shs, 144 1/2c, 287-shs, 145c, 288-shs, 145 1/2c, 289-shs, 146c, 290-shs, 146 1/2c, 291-shs, 147c, 292-shs, 147 1/2c, 293-shs, 148c, 294-shs, 148 1/2c, 295-shs, 149c, 296-shs, 149 1/2c, 297-shs, 150c, 298-shs, 150 1/2c, 299-shs, 151c, 300-shs, 151 1/2c, 301-shs, 152c, 302-shs, 152 1/2c, 303-shs, 153c, 304-shs, 153 1/2c, 305-shs, 154c, 306-shs, 154 1/2c, 307-shs, 155c, 308-shs, 155 1/2c, 309-shs, 156c, 310-shs, 156 1/2c, 311-shs, 157c, 312-shs, 157 1/2c, 313-shs, 158c, 314-shs, 158 1/2c, 315-shs, 159c, 316-shs, 159 1/2c, 317-shs, 160c, 318-shs, 160 1/2c, 319-shs, 161c, 320-shs, 161 1/2c, 321-shs, 162c, 322-shs, 162 1/2c, 323-shs, 163c, 324-shs, 163 1/2c, 325-shs, 164c, 326-shs, 164 1/2c, 327-shs, 165c, 328-shs, 165 1/2c, 329-shs, 166c, 330-shs, 166 1/2c, 331-shs, 167c, 332-shs, 167 1/2c, 333-shs, 168c, 334-shs, 168 1/2c, 335-shs, 169c, 336-shs, 169 1/2c, 337-shs, 170c, 338-shs, 170 1/2c, 339-shs, 171c, 340-shs, 171 1/2c, 341-shs, 172c, 342-shs, 172 1/2c, 343-shs, 173c, 344-shs, 173 1/2c, 345-shs, 174c, 346-shs, 174 1/2c, 347-shs, 175c, 348-shs, 175 1/2c, 349-shs, 176c, 350-shs, 176 1/2c, 351-shs, 177c, 352-shs, 177 1/2c, 353-shs, 178c, 354-shs, 178 1/2c, 355-shs, 179c, 356-shs, 179 1/2c, 357-shs, 180c, 358-shs, 180 1/2c, 359-shs, 181c, 360-shs, 181 1/2c, 361-shs, 182c, 362-shs, 182 1/2c, 363-shs, 183c, 364-shs, 183 1/2c, 365-shs, 184c, 366-shs, 184 1/2c, 367-shs, 185c, 368-shs, 185 1/2c, 369-shs, 186c, 370-shs, 186 1/2c, 371-shs, 187c, 372-shs, 187 1/2c, 373-shs, 188c, 374-shs, 188 1/2c, 375-shs, 189c, 376-shs, 189 1/2c, 377-shs, 190c, 378-shs, 190 1/2c, 379-shs, 191c, 380-shs, 191 1/2c, 381-shs, 192c, 382-shs, 192 1/2c, 383-shs, 193c, 384-shs, 193 1/2c, 385-shs, 194c, 386-shs, 194 1/2c, 387-shs, 195c, 388-shs, 195 1/2c, 389-shs, 196c, 390-shs, 196 1/2c, 391-shs, 197c, 392-shs, 197 1/2c, 393-shs, 198c, 394-shs, 198 1/2c, 395-shs, 199c, 396-shs, 199 1/2c, 397-shs, 200c, 398-shs, 200 1/2c, 399-shs, 201c, 400-shs, 201 1/2c, 401-shs, 202c, 402-shs, 202 1/2c, 403-shs, 203c, 404-shs, 203 1/2c, 405-shs, 204c, 406-shs, 204 1/2c, 407-shs, 205c, 408-shs, 205 1/2c, 409-shs, 206c, 410-shs, 206 1/2c, 411-shs, 207c, 412-shs, 207 1/2c, 413-shs, 208c, 414-shs, 208 1/2c, 415-shs, 209c, 416-shs, 209 1/2c, 417-shs, 210c, 418-shs, 210 1/2c, 419-shs, 211c, 420-shs, 211 1/2c, 421-shs, 212c, 422-shs, 212 1/2c, 423-shs, 213c, 424-shs, 213 1/2c, 425-shs, 214c, 426-shs, 214 1/2c, 427-shs, 215c, 428-shs, 215 1/2c, 429-shs, 216c, 430-shs, 216 1/2c, 431-shs, 217c, 432-shs, 217 1/2c, 433-shs, 218c, 434-shs, 218 1/2c, 435-shs, 219c, 436-shs, 219 1/2c, 437-shs, 220c, 438-shs, 220 1/2c, 439-shs, 221c, 440-shs, 221 1/2c, 441-shs, 222c, 442-shs, 222 1/2c, 443-shs, 223c, 444-shs, 223 1/2c, 445-shs, 224c, 446-shs, 224 1/2c, 447-shs, 225c, 448-shs, 225 1/2c, 449-shs, 226c, 450-shs, 226 1/2c, 451-shs, 227c, 452-shs, 227 1/2c, 453-shs, 228c, 454-shs, 228 1/2c, 455-shs, 229c, 456-shs, 229 1/2c, 457-shs, 230c, 458-shs, 230 1/2c, 459-shs, 231c, 460-shs, 231 1/2c, 461-shs, 232c, 462-shs, 232 1/2c, 463-shs, 233c, 464-shs, 233 1/2c, 465-shs, 234c, 466-shs, 234 1/2c, 467-shs, 235c, 468-shs, 235 1/2c, 469-shs, 236c, 470-shs, 236 1/2c, 471-shs, 237c, 472-shs, 237 1/2c, 473-shs, 238c, 474-shs, 238 1/2c, 475-shs, 239c, 476-shs, 239 1/2c, 477-shs, 240c, 478-shs, 240 1/2c, 479-shs, 241c, 480-shs, 241 1/2c, 481-shs, 242c, 482-shs, 242 1/2c, 483-shs, 243c, 484-shs, 243 1/2c, 485-shs, 244c, 486-shs, 244 1/2c, 487-shs, 245c, 488-shs, 245 1/2c, 489-shs, 246c, 490-shs, 246 1/2c, 491-shs, 247c, 492-shs, 247 1/2c, 493-shs, 248c, 494-shs, 248 1/2c, 495-shs, 249c, 496-shs, 249 1/2c, 497-shs, 250c, 498-shs, 250 1/2c, 499-shs, 251c, 500-shs, 251 1/2c, 501-shs, 252c, 502-shs, 252 1/2c, 503-shs, 253c, 504-shs, 253 1/2c, 505-shs, 254c, 506-shs, 254 1/2c, 507-shs, 255c, 508-shs, 255 1/2c, 509-shs, 256c, 510-shs, 256 1/2c, 511-shs, 257c, 512-shs, 257 1/2c, 513-shs, 258c, 514-shs, 258 1/2c, 515-shs, 259c, 516-shs, 259 1/2c, 517-shs, 260c, 518-shs, 260 1/2c, 519-shs, 261c, 520-shs, 261 1/2c, 521-shs, 262c, 522-shs, 262 1/2c, 523-shs, 263c, 524-shs, 263 1/2c, 525-shs, 264c, 526-shs, 264 1/2c, 527-shs, 265c, 528-shs, 265 1/2c, 529-shs, 266c, 530-shs, 266 1/2c, 531-shs, 267c, 532-shs, 267 1/2c, 533-shs, 268c, 534-shs, 268 1/2c, 535-shs, 269c, 536-shs, 269 1/2c, 537-shs, 270c, 538-shs, 270 1/2c, 539-shs, 271c, 540-shs, 271 1/2c, 541-shs, 272c, 542-shs, 272 1/2c, 543-shs, 273c, 544-shs, 273 1/2c, 545-shs, 274c, 546-shs, 274 1/2c, 547-shs, 275c, 548-shs, 275 1/2c, 549-shs, 276c, 550-shs, 276 1/2c, 551-shs, 277c, 552-shs, 277 1/2c, 553-shs, 278c, 554-shs, 278 1/2c, 555-shs, 279c, 556-shs, 279 1/2c, 557-shs, 280c, 558-shs, 280 1/2c, 559-shs, 281c, 560-shs, 281 1/2c, 561-shs, 282c, 562-shs, 282 1/2c, 563-shs, 283c, 564-shs, 283 1/2c, 565-shs, 284c, 566-shs, 284 1/2c, 567-shs, 285c, 568-shs, 285 1/2c, 569-shs, 286c, 570-shs, 286 1/2c, 571-shs, 287c, 572-shs, 287 1/2c, 573-shs, 288c, 574-shs, 288 1/2c, 575-shs, 289c, 576-shs, 289 1/2c, 577-shs, 290c, 578-shs, 290 1/2c, 579-shs, 291c, 580-shs, 291 1/2c, 581-shs, 292c, 582-shs, 292 1/2c, 583-shs, 293c, 584-shs, 293 1/2c, 585-shs, 294c, 586-shs, 294 1/2c, 587-shs, 295c, 588-shs, 295 1/2c, 589-shs, 296c, 590-shs, 296 1/2c, 591-shs, 297c, 592-shs, 297 1/2c, 593-shs, 298c, 594-shs, 298 1/2c, 595-shs, 299c, 596-shs, 299 1/2c, 597-shs, 300c, 598-shs, 300 1/2c, 599-shs, 301c, 600-shs, 301 1/2c, 601-shs, 302c, 602-shs, 302 1/2c, 603-shs, 303c, 604-shs, 303 1/2c, 605-shs, 304c, 606-shs, 304 1/2c, 607-shs, 305c, 608-shs, 305 1/2c, 609-shs, 306c, 610-shs, 306 1/2c, 611-shs, 307c, 612-shs, 307 1/2c, 613-shs, 308c, 614-shs, 308 1/2c, 615-shs, 309c, 616-shs, 309 1/2c, 617-shs, 310c, 618-shs, 310 1/2c, 619-shs, 311c, 620-shs, 311 1/2c, 621-shs, 312c, 622-shs, 312 1/2c, 623-shs, 313c, 624-shs, 313 1/2c, 625-shs, 314c, 626-shs, 314 1/2c, 627-shs, 315c, 628-shs, 315 1/2c, 629-shs, 316c, 630-shs, 316 1/2c, 631-shs, 317c, 632-shs, 317 1/2c, 633-shs, 318c, 634-shs, 318 1/2c, 635-shs, 319c, 636-shs, 319 1/2c, 637-shs, 320c, 638-shs, 320 1/2c, 639-shs, 321c, 640-shs, 321 1	



## Steel.

THREE CLASS PRIZE MEDALS, CLASSES 1, 21, 22, Great Exhibition of Industry LONDON, 1861.

MEDAL OF HONOUR, SOCIETY OF ARTS & INDUSTRY, LONDON, 1856.

1st CLASS PRIZE MEDAL, CLASS 1st UNIVERSAL EXHIBITION OF INDUSTRY PARIS, 1855.

**COCKER BROTHERS**  
(Limited.)  
SUCCESSORS TO  
**SAM'L COCKER & SON,**  
(Established 1752.)  
**SHEFFIELD, ENGLAND**

## MANUFACTURERS OF

CAST, SHEAR, SHEET AND BLISTERED STEEL, OF EVERY DESCRIPTION.  
BEST CAST STEEL WIRE, ADAPTED SPECIALLY FOR MECHANICAL PURPOSES;  
Also for ROPES, NEEDLES, FISH HOOKS, PINS, CRINOLINE, &c.  
BEST CAST STEEL FILES, SAWS, EDGE TOOLS,  
HACKLES, GILLS, CARD CLOTHING, CARD TEETH, HACKLE AND GILL PINS,  
FISH HOOKS, NEEDLES, &c.

ALSO

GENERAL MERCHANTS.

**F. W. MOSS,**

Successor to JOSHUA MOSS &amp; GAMBLE BROS.

FRANKLIN WORKS, WADLEY BRIDGE WORKS, WILKLEY WORKS, SHEFFIELD, ENGLAND.

## STEEL AND FILES.

Principal Depots: 80 John St., N. Y., and 512 Commerce St., Phila.

MOSS &amp; GAMBLE SUPERIOR C. S. "FULL WEIGHT" FILES,

Cast Steel Hammers and Sledges. Also, "M. &amp; G." Anvils and Vises.

WARRANTED CAST STEEL, especially adapted for DIES and TURN-  
PUNCHES and all kinds of MACHINIST'S TOOLS.  
Celebrated Improved Mild Centre Cast Steel, for Taps, Reamers, and Milling Tools.  
Warranted not to crack in hardening Taps of any size.  
Swedish Spring Steel, especially adapted to Locomotive and Railway Car Springs.  
English Spring and Plow Plate Steel.

Sheet Cast Steel Shear, German, Round Machinery, Hammer, For and Shovel Steel

GENERAL MERCHANT.

**WILSON HAWKSWORTH, ELLISON & CO.,**

Vienna Universal Exhibition, 1873.  
THE MEDAL FOR MERIT  
Awarded for Excellence & Perfection  
in Material & Workmanship.  
W. H. E. & CO. have pleasure in announcing the  
Award of the MEDAL FOR MERIT for their Exhibit  
of Crucible Cast Steel, Files, Steel Wire, Tools, &c.  
This is the ONLY Award to any Exhibitor of  
STEEL WIRE in the British Section.  
Manufacturers of  
**STEEL,**  
**Steel Wire, &c.,** AND GENERAL MERCHANTS.  
CARLISLE WORKS, - - - SHEFFIELD, ENG.  
New York, 79 John Street. {Agencies: Boston, 21 Oliver Street.  
Philadelphia, 505 Commerce Street. New Orleans, La. 111 Gravier St.

Isaac Jenks & Sons,  
MINERVA AND BEAVER WORKS, WOLVERHAMPTON, ENGLAND.

MANUFACTURERS OF

JENKS' SPRING STEEL, "MINERVA" SWEDEN, AND "ANGLO" CAST SPRING STEEL

"JENKS" TIRE, TOE CORK, SLEIGH SHOE, BLISTER, AND PLOW STEEL;

ALSO,

"BEAVER" PLOW, TIRE, AXE, AND SHEET IRON.

VAN WART &amp; MCCOY, Agents, 134 &amp; 136 Duane Street, N. Y.

**J. & RILEY CARR,**

MANUFACTURERS OF SUPERIOR

## STEEL

For Tools, Cutlery, Saws, Files, Augers, Gimblets, &amp;c.; Sheet Cast Steel for SPRINGS AND STAMPING COLD;

ALSO THE CELEBRATED

**DOG BRAND FILES,**

Unsurpassed, if equaled in quality.

ley Lane Works, Sheffield, England.

Warehouse, 82 John St., New York.

Established 1810.

HENRY MOORE, Attorney.

**STEPHENS & CO.,**

Manufacturers of

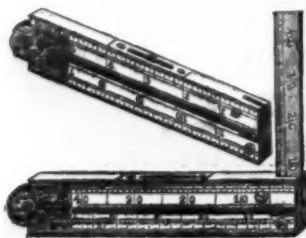
**U. S. Standard Boxwood and Ivory RULES.**

Also Exclusive Manufacturers of

**L. C. STEPHENS' PATENT COMBINATION  
RULE.**

Riverton, - - - Conn.

Boxwood and Ivory Rules having been our specialty  
for over twenty years, we guarantee the uniform excellence  
which has always characterized our goods.  
Price Lists on application.



## Steel.

**SANDERSON BROTHERS & COMPANY,**  
(LIMITED)

DARNALL WORKS, ATTERCLIFFE FORGE, } SHEFFIELD, ENGLAND.

Sole Manufacturers of the CELEBRATED

## CAST STEEL,

Warranted most SUPERIOR and UNSURPASSED for  
**TOOLS and GRANITE ROCK DRILLS.**A full assortment of this universally approved OLD BRAND of  
English Steel, and**ARMITAGE'S GENUINE MOUSEHOLE ANVILS,**

For Sale by

**EDWARD FRITH, 16 Cliff Street, New York.****FRANCIS HOBSON & SON,**

91 John Street, NEW YORK,

Sole Manufact'rs of "CHOICE" Extra Cast Steel.

Manufacturers of all Descriptions of Steel.

Manufacturers of Every Kind of Steel Wire.

Don Works, Sheffield, England.

**S. & C. WARDLOW,**

MANUFACTURERS OF THE CELEBRATED

Cast and Double Shear  
STEEL,In Bars, Sheets and Coils, for fine Pen and Pocket Cutlery, Table, Carving,  
Butcher and Shoe Knives, Turning Tools, Dies, Files, Clock or other Springs,  
Saws and Tools of every variety.

SHEFFIELD, ENGLAND.

Office of S. &amp; C. WARDLOW, 95 John Street, New York.

*In calling the attention of consumers of Steel to  
any of the various above enumerated, we would respectfully assure  
them of our ability to supply an article, that cannot be equalled in  
quality, temper, and adaptation in all respects to the various purposes  
for which it may be required. Half a century of practical expe-  
rience in all departments of Steel manufacture, a long established  
reputation in England, and the endorsement of Europe, and in the Eastern  
States principally of this Country, encourage us to solicit a universal  
trial of our Steel for the above or other purposes for which a first  
class material in quality, temper, and durability is needed.*

**JOHN NICHOLSON & SONS**

MOWBRAY STEEL WORKS, Sheffield, England.

Manufacturers of all descriptions of **CAST STEEL**, especially **BEST  
CAST STEEL for Axes and Edge Tools.**NEW YORK OFFICE, - - - 88 Chambers Street.  
Boston Agency, F. A. HOWARD, 38 Kilby St., Boston.**JERE. ABBOTT,**

(Successor to ABBOTT &amp; HOWARD.)

## Commission Merchant.

Agent for

**THOMAS FIRTH & SONS,**Manufacturers of STEEL and LOCOMOTIVE TIRES,  
SHEFFIELD, ENGLAND.**N. H. HOGLUND,**

SWEDISH IRON, - - - Stockholm, Sweden.

**J. G. HALBACH FRANSEN,**

GENUINE HALBACH STEEL, - - - Remscheid, Prussia.

OFFICES: 35 Oliver Street, BOSTON.  
81 John Street, NEW YORK.**G. SANDERSON & CO.,**

Manufacturers of all descriptions of

## STEEL.

SHEFFIELD, ENGLAND.

Particular attention is paid to quality and temper for

Files, Saws, Table and Pocket Cutlery, Augers, Shovels, &amp;c.

ALSO STEEL of superior quality for Turning Tools, Taps, Dies, Drills, &amp;c.

Hot and Cold Rolled Sheets for Clock Springs, Corset Clips, Pens, &amp;c.

Makers of the Celebrated **ROCK BORING DRILL STEEL.**

Warehouse, 57 John Street, New York.

**D. G. GAUTIER & CO.,**

MANUFACTURERS OF

Hammered and Rolled STEEL of every description  
JERSEY CITY, NEW JERSEY.

DUDLEY G. GAUTIER.

JOSIAH H. GAUTIER.

## Steel.

**Sheffield Steel Works.**

(Established in 1848.)

**SINGER, NIMICK & CO.**

Pittsburgh, Pa.,

Manufacturers of Extra Quality Tool

## CAST STEEL,

Patent Rolled

**SAW PLATES,**

All descriptions of Cast and German

**Spring and Plow Steel**

Elliptic and Side Springs, Bent Springs,

**AXLES, STEEL TIRE,**Plow Wings, Shares, Cultivators,  
Reaper Bars, Bow Bars, &c., &c.

Warehouse, 83 Water and 100 First Streets.

**MILLER, METCALF & PARKIN,****Crescent Steel Works,**

PITTSBURGH, PA.,

Manufacturers of all descriptions of

## STEEL

EQUAL TO ANY IN THE MARKET

Office, 339 Liberty St.,

PITTSBURGH, PA.

## Gunpowder.

## GUNPOWDER

**DUPONT'S**Sporting, Shipping, and Mining  
**POWDER.****DUPONT'S GUNPOWDER MILLS,**  
ESTABLISHED IN 1801,Have maintained their great reputation for 75  
years. Manufacture the**Celebrated Eagle Ducking,**  
**Eagle Rifle, & Diamond****Grain Powder.**

THE MOST POPULAR POWDER IN USE.

Also, SPORTING, MINING, SHIPPING, AND BLAST-  
ING POWDER.of all kinds and descriptions.  
For sale in all parts of the country. Represent-  
ed by**F. L. KNEELAND**

70 Wall Street, NEW YORK.

## GUN-POWDER

**LAFLIN & RAND POWDER CO.,**

21 Park Row, New York,

Invite the attention of the Hardware Trade to their  
facilities for delivering**Blasting, Mining and Rifle**

In every part of the United States.

From having agencies and magazines at all promi-  
nent points, beside our works atKingston, Newburgh, Saugerties and  
Schaghticoke, N. Y.; Moosic, Rush-  
dale and Cressona, Pa.; and  
Platteville, Wis.The superiority is well known of our brands of  
Sporting Powder.**Orange Rifle, Orange Ducking,**  
**Orange Lightning.****ELECTRIC BLASTING APPARATUS.****SAFETY-FUSE at wholesale.****EATON'S METAL CLOTH BINDING.**

An article long been wanting to fully protect the bor-  
der of Oil Cloths, Mats, etc. from being worn out, thus  
keeping them in good order without being continually  
harassed with quality of carpet binding, which needs  
constant attention to keep in good order. This binding  
is metal, in the form of a clasp, has holes pierced, and is  
seven feet in length. It is easily put on, cheap, ornate,  
and neat. The trade supplied by **GEORGE  
S. EATON**, First St. cor. North Third, Brooklyn,  
E. D., N. Y. Box 78.

**GEO. M. EDDY & CO.,**Manufacturers of Measuring Tapes,  
353 Nassau Avenue, Brooklyn, N. Y.

Manufacturers of Paine's Patent Steel Standard Meas-  
uring Tapes, for Surveyors, Engineers and Mechanics  
requiring a correct measure of great length according to  
U. S. Standard. Also of Tape measures for the same  
uses. Lumbermen, Machinists, Tailors, Shoemakers,  
Dressmakers &c. Catalogues on application.



## Steel.

**HUSSEY, WELLS & CO.**

MANUFACTURERS OF ALL DESCRIPTIONS OF

**CAST STEEL,**

INCLUDING

Best Refined Steel for Edge Tools.

PARTICULAR ATTENTION PAID TO THE MANUFACTURE OF STEEL FOR

**Railroad Supplies, Homogeneous Plates**

FOR LOCOMOTIVES, BOILERS, AND FIRE BOXES,

Smoke-Stack Steel, Cast Steel Forgings for Crank Pins, Car Axles, &amp;c.

ALSO, MANUFACTURERS OF THE CELEBRATED BRAND

**"Hussey, Wells & Co. Cast Spring Steel,"**

For Elliptic Springs for Railroad Cars &amp; Locomotives.

PENN AVENUE and SEVENTEENTH ST., PITTSBURGH, PA.

BRANCH OFFICES:

30 Gold St., New York.

7 Hamilton St., Boston.

146 E. Lake St., Chicago.

**ANDERSON & WOODS,**

MANUFACTURERS OF

**Best Refined CAST STEEL.**

CAST and GERMAN PLOW and SPRING STEEL.

FIRST AVENUE AND ROSS STREET, - - - PITTSBURGH, PA.

**THE EDGAR THOMSON STEEL CO., LIMITED.**

MANUFACTURERS OF

**STEEL RAILS, BLOOMS & INGOTS**

General Office and Works at Bessemer Station (Penn. R. R.), Allegheny County, Pa.

New York Office, 57 Broadway.

The members of the Edgar Thomson Steel Company, Limited, have had large experience in manufacturing and in railway management; their works are the most complete in the world, with all the late improvements, and are located in the best Bessemer metal district in the United States, and their managing officers are experienced in the manufacture of Bessemer Steel.

The Company warrants its rails equal in quality to any manufactured in the United States.

Rails of any weight or section furnished on short notice. Orders for trial lots solicited.

Branch Office and P. O. Address, No. 41 Fifth Ave., Pittsburgh, Pa.

D. McCANDLESS,

Chairman.

W. M. P. SHINN,

General Manager.

**LABELLE STEEL WORKS.****SMITH, SUTTON & CO.,**

MANUFACTURERS OF ALL KINDS OF

**STEEL.**

Also, Springs, Axles, Rake Teeth, &amp;c.

OFFICE &amp; WORKS, Ridge, Lighthill &amp; Belmont Sts., &amp; Ohio River, Allegheny.

Post Office Address, Pittsburgh, Pa.

**MIDVALE STEEL WORKS.**

Works and Office, NICETOWN, PHILADELPHIA, PA.

MANUFACTURERS OF

**CRUCIBLE AND OPEN HEARTH STEEL,**

Steel Locomotive Tires. Steel Axles of every description.

STEEL FORGINGS UP TO 8000 lbs. IN WEIGHT.

Solid Steel Castings, Hammer Dies, Frogs, Crossings, etc.

BEST TOOL, MACHINERY AND SPRING STEELS.

WM. SELLERS, Pres.

CHAS. A. BRINLEY, Supt.

MARRIOTT C. SMYTH, Sec. &amp; Treas.

**CHROME STEEL COMPANY,**

MANUFACTURERS OF

**CHROME CAST STEEL,**

WARRANTED SUPERIOR TO ANY STEEL IN THE MARKET—EITHER ENGLISH OR AMERICAN—FOR EVERY PURPOSE.

Principal Office &amp; Works, Kent Ave. and Keep St., Brooklyn, E. D., N. Y.

AGENCIES.

Kimball Bros. &amp; Co., Chicago, Ill.

Harrington, Hopkins &amp; Co., San Francisco and

Serrano, Cal.

M. M. Beck &amp; Co., St. Louis, Mo.

Potter &amp; Hoffman, Philadelphia, Pa.

Geo. Dunbar &amp; Co., Boston, Mass.

Wood &amp; Leggett, Hamilton, Ont.

**ALBANY & RENSSLAER IRON & STEEL CO.,**

Troy, N. Y.,

Office in New York City, 56 BROADWAY.

MANUFACTURERS OF

**Bessemer Railway Steel,**

MERCHANT BARS, TIRE AND SHAFTING,

Railroad Iron, Pig Iron, Merchant and Ship Iron,

AGENCIES IN BOSTON AND PHILADELPHIA.

## Hardware.

**SPEAR & JACKSON,**

Sheffield, England.

MANUFACTURERS OF

**Saws, Files, Edge Tools & Steel.**JOHN L. FISHER, Agent,  
100 Chambers Street, NEW YORK.**JOHN WILSON'S CELEBRATED**

BUTCHERS' KNIVES,

BUTCHERS' STEELS,

AND  
SHOE KNIVES.THE TRADE MARK, IN ADDITION  
TO THE NAME,  
IS STAMPED UPON EVERY ARTICLE MANUFACTURED BY  
**JOHN WILSON.**GRANTED A.D. 1766, BY THE  
CORPORATION OF CUTLERS OF SHEFFIELD,  
AND PROTECTED BY ACT OF PARLIAMENT.

Works:—SYCAMORE STREET, SHEFFIELD. ESTABLISHED in the Year 1760

BUYERS ARE SPECIALLY CAUTIONED AGAINST  
IMITATIONS OF THE MARK, AND THE  
SUBSTITUTION OF COUNTERFEITS  
BEARING THE NAME, "WILSON," ONLY.**ALFRED FIELD & CO.,**

Hardware Commission Merchants,

IMPORTERS AND EXPORTERS.

Principal Office and Warehouses:

Birmingham, Sheffield &amp; Liverpool, Eng.; New York, U. S.; &amp; Montreal, Canada.

A large line of Birmingham and Sheffield goods in stock at

93 Chambers and 75 Reade Streets, NEW YORK.

**HERMANN BOKER & CO.,**

OFFICES AND WAREHOUSES:

NEW YORK, 101 and 103 Duane and 91 and 93 Thomas Streets.

GEMSCHEID and SOLINGEN (Prussia.) H. BOKER &amp; CO.

SHEFFIELD (England), No. 3 Arundel Lane, Represented by Mr. ARTHUR LEE.

LIEGE (Belgium), Represented by Mr. LOUIS MULLER.

Manufacturers and Importers of Cutlery, Guns, Hardware and Railroad Material.

Proprietors of TRENTON VISE AND TOOL WORKS, Trenton, N. J.—Vises, Picks,

Mattocks, Grub Hoes, Sledges, Hammers, Bridge Work, Turn Tables, etc.

Proprietors of the MANHATTAN CUTLERY CO., "O. K." Razors.

LAMSON &amp; GOODNOW MFG. CO., Shelburne Falls, Mass.—Table Cutlery and Butcher

Knives.

W. &amp; S. Butcher's Files, Edge Tools and Razors, the largest stock in the United States.

Geo. Wostenholm &amp; Son's Knives, Scissors and Razors, the largest stock in the U. S.

John Wilson's Butcher and Shoe Knives.

Peter Wright's and Armitage Anvils.

We always have on hand a full assortment of

German and English Hardware, Cutlery, Guns, Gun Material,

Chains, Heavy Goods.

**REED & BARTON,**

Manufacturers of FINE

**Electro-Plated Table Ware**

OF EVERY DESCRIPTION,

Would invite especial attention to the great variety of new and original designs of

Dinner, Tea and Water Sets, Epergnes, Cake and Fruit Dishes, Ice

Pitchers, Vases, Mantel Ornaments, &amp;c.,

SUITABLE FOR

**BRIDAL & HOLIDAY PRESENTS.**

Salesroom, No. 2 Maiden Lane, New York.

Factories, Taunton, Mass.

**WESTON'S****Differential Pulley Blocks**

Also known as

DOYLE'S, HALL'S AND BIRD'S

are now all merged and are controlled exclusively by

**THE YALE LOCK MFG. CO.,**

HENRY R. TOWNE, President, Stamford, Conn.

VAN WART &amp; MCCOY, New York Agents, 131 &amp; 136 Duane Street.

T. A. WESTON, Mechanical Engineer, with the Company.

**SOMETHING NEW!****"Zero" Stove Cover Lifter.**

Patented July 27th, 1875.

Made: one piece from a superior quality of sheet iron, with a perforated cylindrical handle. Its superior advantages over any other style of cover lifter are manifest, as it will not break or bend, keeps always cool, and will lift any stove cover made. Send for Circular.

**EAST RIVER SHEET METAL MFG. CO.**

SOLE MANUFACTURERS,

206 Water Street, New York

**JOHN MAXHEIMER,**

Patented,

June 3, 1862; April 4, 1863

Dec. 23, 1875; Jan. 20,

1876; Dec. 22, 1874.

April 30, 1875.

Manufacturer of

—FULL SIZE OF—

WIRE CONNECTION

JAPANNED and

PATENT EUREKA

Bright Metal

BIRD CAGES.

Nos. 247 &amp; 249 Pearl Street

NEW YORK.

**IVES, WOODRUFF AND CO.**

MANUFACTURERS OF

**Eagle Screw Clamps,**

FINE

CARRIAGE

MOUNTINGS

in Iron, Brass, Oak

and Gold.

SUPERIOR

Malleable Iron

Made under the

ANDREW'S PATENT PROCESS.

Mount Carmel, - - - CONN.

**E. S. LEE & CO.'S**

descriptive circular and

price list of

WATER'S

Tree Pruner

for 1876 will be mailed to

all applicants.

Extraordinary inducements offered to jobbers

and the trade throughout

the United States to en-

courage the sale of some-

light, durable, practical,

cheap. All goods

warranted.

Prices:

With 4 foot pole.....\$2 50

" 5 " " "..... 3 75

" 6 " " "..... 5 00

" 8 " " "..... 7 50

" 10 " " "..... 10 00

Address

E. S. LEE &amp; CO.,

Rochester, N. Y.

**IXL****The Woman's Friend.**

The Best Finished &amp; Most Perfect

FLAT IRON ever made.

INTERCHANGEABLE HANDLE and

SHIELD COMBINED.

Patented May 4, 1875

Set No. 1—3 Irons of 5, 6 and 7 lbs. 1 Handle.....\$2 00

" 2—3 " " " 6, 7 and 8 lbs. "..... 2 50

" 3—3 " " " 7, 8 and 9 lbs. "..... 3 00

Nickel Plated 1272..... 75 cents extra.

Packed in cases for 12 sets or 36 Irons. Send for illustrated Circular.

**BROOKLYN SAD IRON CO.,**

85 First Street, Brooklyn, E. D., N. Y.

The Attention of Dealers is invited to the

**EAGLE WASHER.**

It embodies several important new features, a very

complete arrangement of parts, and is faultless in construction. Send for descriptive circular and prices to the manufacturers.

**OAKLEY & KEATING,**

40 Cortlandt St., N. Y.

**Baltimore****COMMISSION HARDWARE HOUSE.****EDW'D M. KEITH,**

(Late of KEITH &amp; KELSO.)

No. 25 S. Charles Street, - - - BALTIMORE

SOLE AGENT FOR

Chesapeake Nails, R. Mann's Axes,

NAYLOR &amp; CO.'S CAST STEEL

AND NAIL RODS,

And S. Loring's Tacks,

AND DEALER IN

**General Hardware.**

SOLICITS CONSIGNMENTS.

Clark's Patent Noiseless

Pressure Blowers and

Exhaust Fans.

R. W. WILD, Agent,

21 Cortlandt St., New York

Portable and Stationary

Engines, Boilers, Grist

Mills, etc.

**LOUIS RAISER,**

Successor to GEORGE REUTHER,

**Machinist, Model and****Lathe Maker.**

125 &amp; 127 Worth Street, NEW YORK.

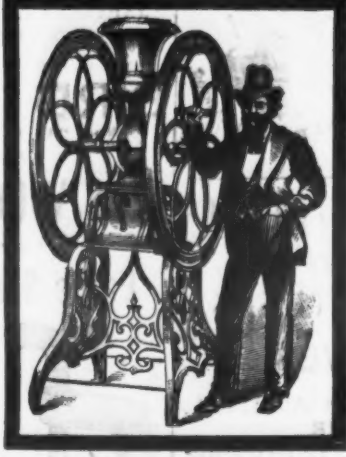
Bet. Centre &amp; Elm Sts. (Raw Mill)

Residence, 214 Canal St.



**TWO SILVER MEDALS AWARDED**  
**ENTERPRISE MANFG CO. PA.**  
 PHILADELPHIA, 1876

**AMERICAN COFFEE, DRUG AND SPICE MILLS.**



Measuring Fanels  
 BUNG-HOLE BORERS,  
 TOBACCO CUTTERS  
 Cheese Cutters,  
 CORK PRESSERS  
 Etc., Etc.

**GRAHAM & HAINES,**  
 AGENTS,  
 88 Chambers St.  
 NEW-YORK.

**NO EXTRA CHARGE FOR**  
**NICKEL-PLATED HOPPERS WITH EAGLE DOME TOPS.**  
 SEND FOR ILLUSTRATED CATALOGUE.

**WHEELING HINGE CO.,**  
 Wheeling, West Va.,  
 Manufacturers of

Wrought Butts, Strap & T Hinges, Wrought Hooks,  
 Hasps & Staples, Wrought Repair  
 Links & Washers,  
**GRAHAM & HAINES, Sole Agents, 88 Chambers Street, N. Y.**

**AMERICAN BUTT CO.,**  
 PROVIDENCE, R. I., Manufacturers of

**Cast Butt Hinges,**  
 AND  
**Miscellaneous Hardware.**



Send for Illustrated Catalogue.  
 New York Warehouse with  
**Messrs. GRAHAM & HAINES,**  
 No. 88 Chambers Street.  
 ORDERS FOR CASTINGS SOLICITED.  
 See New Bed Fast.


**QUACKENBUSH, TOWNSEND & CO.,**  
**Hardware, Cutlery, &c.**  
 85 Chambers & 67 Reade Sts., N. Y.

Depot for  
**THOS. JOWITT & SONS,**  
 (Sheffield, England.)  
 FILES and HORSE RASPS.  
 Rough & Ready  
 And  
 CLIPPER SCYTHES,  
 Warranted.

Manufacturers of the  
**CHALLENGE**  
**DOOR & GATE SPRING.**  
 PATENTED  
 JULY 11, 1871.  
 Patented March 4, 1873.

Agents for  
**Norwich Lock**  
**MFG. CO.**  
 "BEAVER"  
 (American)  
 FILES and HORSE RASPS.  
 "WIDE AWAKE"  
 AXES.

**Baltimore STEEL HOE Works.**  
**O. H. HICKS & CO.**  
 Manufacturers of the  
**Lockwood Hoe,**  
 Send for Sample and Price List.  
 BALTIMORE, MD.



**G. W. Bradley's Edge Tools.**

Butchers' Cleavers,  
 Butchers' Choppers,  
 Axes and Hatchets,  
 Grub Hoe and Mattocks,  
 Mill Picks  
 Box Chisels and Scrapers,

Ring Bush Hooks,  
 Axe Eye Bush Hooks,  
 Socket Bush Hooks,  
 Watt's Ship Carpenters' Tools,  
 Carpenters' Drawing Knives,  
 Coopers' and Turpentine Tools.

FOR SALE BY  
**N. WEED, 4 & 6 Gold St., N. Y.**

**SAMUEL LORING'S**  
**PLYMOUTH TACK AND RIVET WORKS**  
 PLYMOUTH, MASS., manufacturer of  
**TACKS, BRADS, NAILS AND**  
**RIVETS.**

Swedes and Common Iron Tacks; Leathered, Carpet  
 Tacks, Lace and Gimp Tacks; Finishing, Hungarian, 2d  
 and 3d Fine, Trunk, Clout, and Clear Box Nails; Black  
 and Tinned Trunk Nails; Zinc, Iron, Copper and Steel  
 Shoe Nails; Brads and Patent Brads; Glaziers' Points  
 &c., &c. **COPPER, BRASS AND IRON**  
**RIVETS**, of all kinds. Coopers' Rivets, from 1 1/2 to 6d,  
 in cases of 100 lbs. each. Hose, Belt and Shoe Rivets  
 and Burs. Oval and Countersunk Heads of extra  
 lengths, made to order. **SHIP AND BOILER RIVETS**  
 OF ALL SIZES AND LENGTHS

**COBB & DREW,**  
 Plymouth, Mass.  
 Manufacturers of Copper, Brass, and Iron Rivets: Com-  
 mon and Swedes Iron, Leathered, Carpet, Lace and Gimp  
 Tacks; Finishing, Hungarian, Trunk, Clout and Clear  
 Box Nails, &c. Rivets made to Order.  
**NEW YORK AGENCY**  
**Grundy & Kenworthy**  
**HARDWARE.**  
 165 Greenwich Street.  
 Agent for the Philadelphia Star Carriage and Tire Bolts

Established in 1836.  
**Shelton Company,**  
 Manufacturers of every variety of  
**TACKS & SMALL NAILS.**  
 Carriage, Machine, Floor, Shoe and  
 Tire Bolts, Coach Screws,  
 Bed Screws, &c.  
 BIRMINGHAM, CONN.

**JAS. FALLOWS & CO.,**  
 MANUFACTURERS AND PATENTERS  
 Tin Toys, Stationery Goods, &c.  
 Rear of 51 and 53 North Third Street,  
 PHILADELPHIA.  
**PAPIER MACHE TOYS, STAMPING &**  
**JAPANNING A SPECIALTY.**

**COVERT SNAP.**  
 TRY IT.



It is the most convenient, durable, safe and reliable Snap  
 ever used. It is easily operated with glove or mitten on.  
 It has a brass coil spring that is four times as long as  
 any other coil spring snap, which will neither rust nor  
 be affected by cold, like steel springs in common use.  
 It is enclosed in the barrel back of the box, making a  
 snap which works freely under all circumstances, and  
 without danger of having its parts broken or disarranged.  
 We manufacture all sizes of Harness Snaps and Round  
 Eye Snaps, and Covert's Patent Thimble to go on rope  
 for Cattle and Horse Ties. Also other goods.  
 Send for price list and circular.

**HOLD BACK & SNAP CO., Troy, N. Y.**

**A. G. COES**  
 PAT. DEC. 26, 1871.

Established in 1839.

**A. G. COES & CO.**  
 WORCESTER,  
 Mass.,  
 Manufacturers of  
 THE GENUINE  
**COES'**  
**SCREW WRENCHES.**



Our goods have been very  
 much improved recently, by  
 making the Bar WIDE as  
 shown in the cut, which makes  
 a 12 in. Wrench as strong as a  
 15 in. made in the ordinary way,  
 and by using

Which cannot be forced back  
 into the handle.  
 Our goods are manufac-  
 tured under Patents dated Feb-  
 ruary 7, 1860, (re-issued June  
 29, 1871), May 2, 1871, and Dec.  
 26, 1871, and any violation of  
 either will be rigorously pro-  
 secuted.

We call particular attention to  
 our new Patent Ferrule, with its  
 Supporting Nut (shown in section  
 in the above cut), which makes  
 the strongest Ferrule fastening  
 known.

**A. G. COES & CO.**  
**TUCKER & DORSEY,**  
 MANUFACTURERS,

**THE BEST**  
**USE**

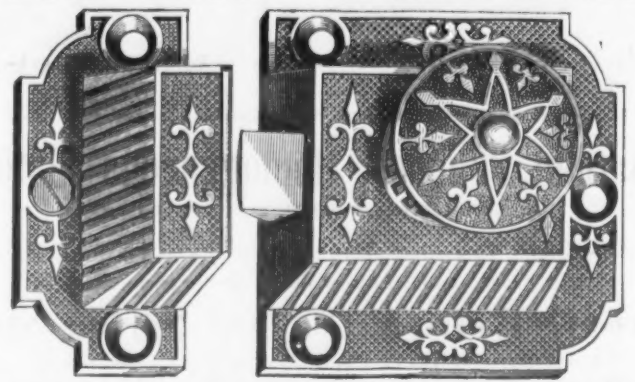


**TICKET**  
**ALARM**  
 TILL MFG. CO.  
 INDIANAPOLIS  
 INDIANA

Indianapolis, Ind.

**The Hart, Bliven & Mead Mfg. Co.,**  
 18 & 20 Cliff Street, and 243 & 245 Pearl Street, New York.  
 Factories at KENSINGTON, CONN.  
 MANUFACTURERS OF

**BUILDERS' HARDWARE.**



Japanned, Brass, Plated, Enameled and Bronze Metal  
**CUPBOARD CATCHES.**  
 Door Bolts, Sash Fasteners, Drawer Pulls, Store Door Handles, &c.,  
 IN GREAT VARIETY.  
 Our Catalogue and Appendix is now ready. Price \$4.50 and charge remitted on receipt of subsequent orders.

**Lloyd, Supplee & Walton,**  
**HARDWARE FACTORS.**  
 MANUFACTURERS OF

**Bonney's Hollow**

**AUGERS.**

Stearn's Hollow Augers

and Saw Vises

Bonney's Spoke Trimmers

Double Edge Snook Shaves

Adjustable Gate Hinges

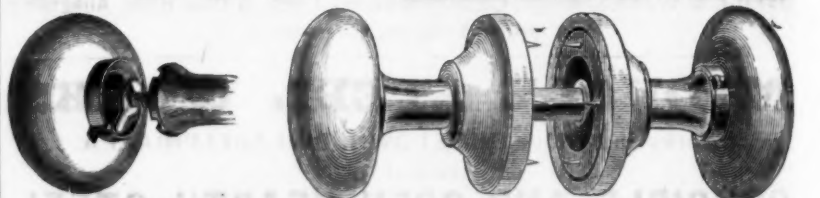
Scandinavian Pad Locks

Flat Key Brass and Iron Pad Locks, &c., &c.

625 Market St., Phila., Pa.



**WHIPPLE'S PATENT**  
**Door Knobs**



**THE WHIPPLE DOOR KNOB**  
 Is the only perfect Door Knob Attachment ever invented.  
**AWARDED A BRONZE MEDAL**

At the American Institute Fair, in New York, for 1874.  
**NO SCREWS USED IN NECK OR ROSES.**  
 Adjusts Perfectly to Doors of Different Thicknesses  
**WITHOUT THE USE OF RINGS.**

The attention of Architects, Builders and Carpenters is specially desired. Circulars fully describing the advantages of this Knob, with Price List, sent on application to

**The Parker & Whipple Co.,**  
 WEST MERIDEN, CONN.,  
 Or 97 CHAMBERS STREET NEW YORK.

**Middletown Tool Co.,**  
 MIDDLETOWN, CONN.  
 Manufacturers of

The Celebrated "Baldwin" Plane Iron.  
**HENSHAW'S SNAPS**  
 Greatly Improved in Style and Pattern.  
**HART, BLIVEN & MEAD MFG. CO., Agents**  
 18 & 20 Cliff Street, N. Y.



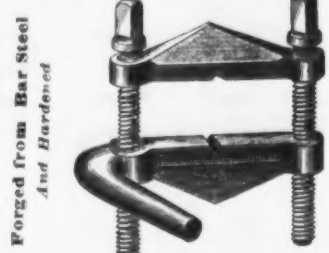




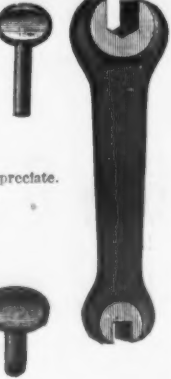


**BILLINGS & SPENCER CO.**MANUFACTURERS OF  
CLAMP, DIE AND COMMON  
LATHE DOCS.

Vienna, 1873



For Progress.



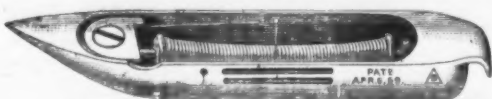
FIRST CLASS ARTICLES.

and something that every machinist and Tool Maker will appreciate.

**DROP FORGINGS.**

For Machine Handles, Lathe Wrenches, Spinning Rings, Marlin Spikes, Clinch Rings, Thumb Screws, Thumb Nuts, and Pa of Drill Chucks, Sewing Machines, Gun, Pi and

Machinery Generally.



TRADE MARK.

**THE BILLINGS PATENT SEWING MACHINE SHUTTLE,**  
Thirty Varieties now made, Forged Solid from Bar Steel and Cold Pressed. Also, Barwick Wheatcroft**Patent Self-Adjusting PIPE WRENCHES, of all sizes.**  
Illustrated Circulars and Price List sent to any order on request. Lawrence St., Hartford, Conn.**EDWARD PHELAN,**

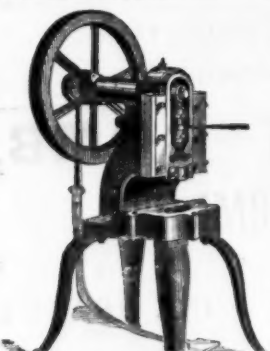
No. 113 Chambers &amp; 95 Reade Streets, New York,

**Manufacturer of AMERICAN HARDWARE.**

Coco &amp; Tait's Pat. Wrenches. Coco Nut Dippers. Maraire's W's Iron Goods. Ax Pick, Sledge &amp; Hammer. Wire Reelers. Shattuck's Platform Counter. Handles. Scale Beams. Scales. Gimble and Gimlet Bits. Patent Tap Borers. Yaw's Cow Bells. Axes, Picks and Hatchets. Axes and other Bits. Cortlandt Horse Nails.

**CHAMPION BARROWS.****WITH WOOD OR IRON WHEELS.**

A first-class article and a specialty, that will make a demand in any market and afford a good margin for dealers. We are prepared to furnish them in large quantities. Manufactured by

**BRYAN MANUFACTURING CO., Bryan, O.****SEMPLE, BIRGE & CO., Sole Western Agents, ST. LOUIS, MO.****A. H. MERRIMAN,**  
Patent Power  
**Punching Presses.**

Patentee and Sole Manufacturer.

I warrant every part of this Machine to stand the shock of the wheel running at 125 revolutions.

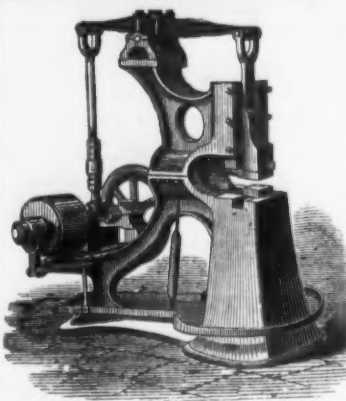
West Meriden, Conn.

**HAMMER & CO.,**  
Branford, Conn.,  
Manufacturers of the following Patented Articles of**MALLEABLE IRON:**Hammer's Adjustable Clamps.  
Hammer's Malleable Iron Oils.  
Hammer's Mail, Iron Hand Lamps.  
Hammer's M. I. Hanging Lamps.

For Sale by all the principal Hardware Dealers.

Malleable Iron Castings

Of Superior Quality made to order

**THE PALMER POWER SPRING HAMMER.**

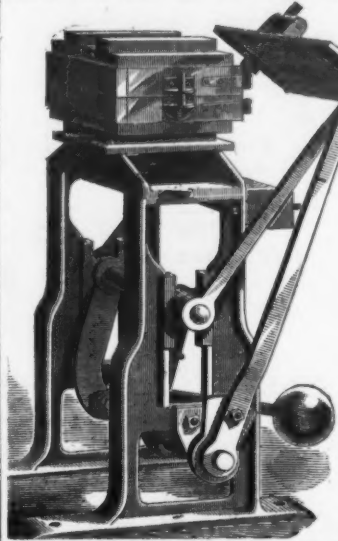
Of these Machines we are building sizes to meet the requirements of all Manufacturers and Workers of Iron and Steel. In simplicity, durability, ease of operation, accuracy, and range of work, we guarantee them superior to any Machines of their kind produced in the world. For prices, references, and full descriptive circulars, address

**S. C. FORSAITH & CO.,**

Manchester, N. H.

**MOLDING MACHINE,**

New and Improved.

**T. F. HAMMER'S PATENT.**

Beside all advantages Molding Machines possess over hand molding, it is especially claimed for this machine, that:

It occupies no more room than a bench for hand molding.

It requires no special flasks or boards, but the same are used as for hand molding.

The light is not obstructed by any part of the machine, as the pressure plate is swung back as shown in the engraving.

Price List on application.

**T. F. HAMMER,**

Branford, Conn.

Malleable Iron Castings made to Order.

Two First Premiums awarded by Franklin Institute Exhibition of 1874.

**C. VAN HAAGEN & CO.,**

2341 and 2343 Callowhill Street, PHILADELPHIA, PA.

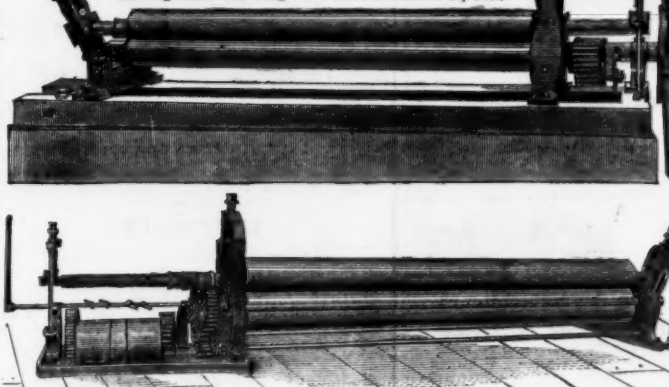
Manufacturers of Latest Improved Machine Tools, Rotary Shapers, two size, Iron Planers, all sizes, Horizontal Drill Attachments, for upright power drills, Self-feeding Portable Drills, hand or power, Expansion Boring Bars, five sizes, Universal Slide Rest, for taper work, Twist Drill Sharpening Machines, automatic and adjustable in every direction, Noiseless Friction Gears, for transmitting up to thirty horse-power. Send for Descriptive Circulars.

**C. A. & W. L. TEAL,**

Manufacturers of

**Improved Boiler Plate Bending Rolls,**

Arranged for removing work from the end of top roll.



Boiler-Plate Planing Machines, Combined Punching and Shearing Machines and Single Power Punching Machines, with Shearing Attachments, for Rolling Mills, Boiler Makers, etc. Attachments for Rolling Mills, Boiler Makers, etc. Rotary Shearing Machines, Steam Engines, with Towing Slide Machines, and Machinery in General. 3029 Chestnut St., Philadelphia.

**W. C. DUYCKINCK,**

Importer, Manufacturer and Dealer in

**Railway, Machinists' & Engineers' SUPPLIES.**

50 &amp; 52 John Street, NEW YORK.

Monthly circulars of new articles or changes in prices mailed to any address.

**CHAPMAN VALVE MFG. CO.,**

77 Kilby Street, Boston.

Water,

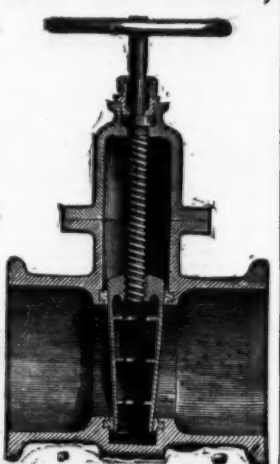
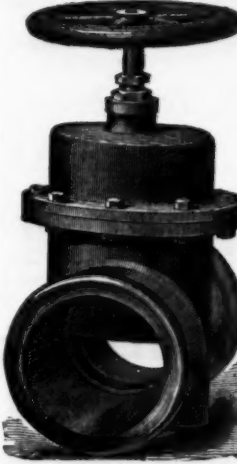
Gas

AND

Steam

**VALVES.****Hydrants.**

Send for circular.

**REPORT OF JUDGES**In Department V, Group 3, at the 44th  
Exhibition of the**AMERICAN INSTITUTE,**  
Held in the City of New York, Oct., 1875.**No. 318, Drawing, Drop & Punching Presses.****THE STILES & PARKER PRESS CO.,**  
Of Middletown, Conn.

The machinery exhibited by these makers is of a character that calls for special commendation. In addition to their well known punching presses, to which a new feature has been added in a press adjustable to an inclination for discharging work left above the die, there are exhibited by them a combined punch and shears, a drawing or blanking press, and a drop.

In all these there is shown the highest mechanical culture, applied to meet every practical requirement, to avoid every practical difficulty, and to enlarge the range of application of the machines, by devices which are at once simple, elegant, and effective. Your committee would unhesitatingly recommend for this exhibition the "Medal of Progress," but find such award debarred by the rule of the Institute, forbidding such award unless a Silver Medal has been previously awarded. We, therefore, respectfully recommend the award of a Silver Medal.

**Silver Medal Awarded.**  
A true copy from the Report on file.

JOHN W. CHAMBERS, Sec'y.

**WOODEN TOOTH****Curry Comb.**

The Best yet Invented.

**CHEAP AND DURABLE.**  
Is Pleasant to the Horse, and does not injure the Brush.**FULLER BROS., Sole Agents,**  
89 Chambers & 71 Reade Streets, N. Y.**DUPLEX CURRY COMB.**

We call the attention of Hardware Dealers to our Double Curry Comb, comprising a fine and coarse side, or virtually two combs in one. It is useful, durable and novel, and needs no argument to convince any one of its practicability. It sells on sight, and is bound to supersede all other combs. We want one reliable dealer in each state or large city to handle it. Correspondence solicited.

Address **I. N. CASSELL,**  
Fredericktown, Ohio.**STEAM PUMPS**Manufactured by  
**CRANE BROS. MFG. CO.,**  
Chicago.**JULIEN CHURN**

AND

**Butter Worker.**

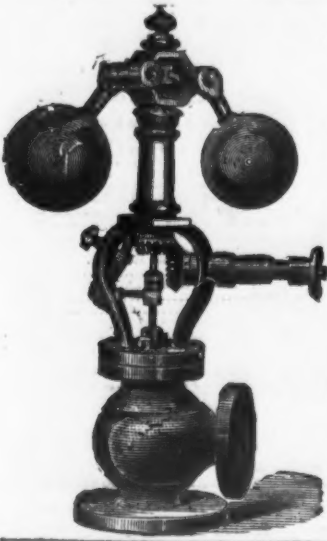
Hardware and Agricultural Implement dealers are offered in the above an article that is now a staple in the trade, having been sold the past nine years from the Atlantic to the Pacific. It is correct in principle, and manufactured in the most substantial and handsome manner. Send for a Descriptive Circular.

Wholesale Agent:  
J. M. McKINSTRY & CO.,  
Ruhl, DuCharme & Co.,  
William Blair & Co.,  
John Nazko & Co.,  
Wootton, Bryant & Ferguson,  
Semple, Birge & Co.,  
W. C. Chamberlin,  
Wickham & Louie,  
Cortland St., N. Y.  
Detroit, Mich.  
Chicago, Ill.  
Milwaukee, Wis.  
Louisville, Ky.  
St. Louis, Mo.  
Davenport, Iowa.  
Keosauqua, Iowa.









## TO ALL WHO USE STEAM-POWER!

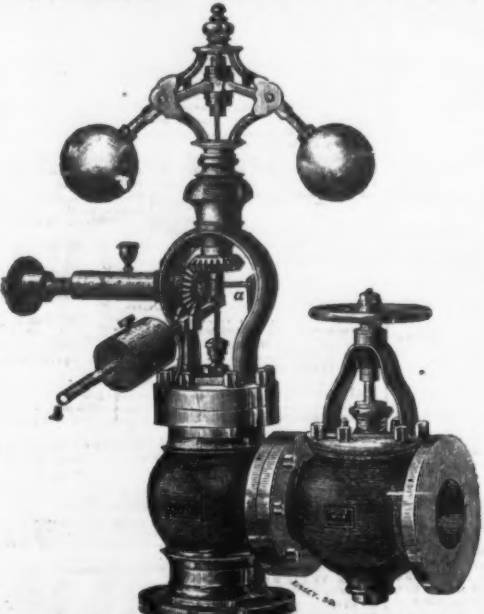
We will put our Governor on any Engine, and guarantee it to prove itself superior to all others. If, after a fair trial, it does not, we will take it off at our own expense.

**Shive Governor Co**  
BETHLEHEM, PA.

ALSO,  
SHIVE'S PATENT WATCHMAN'S  
CLOCK AND DETECTOR,  
AND  
Buoy's Patent Counter Scale,  
No Nest of Weights.

Circulars sent free

## January 25, 1876. REDUCED PRICE LIST OF THE JUDSON PATENT IMPROVED GOVERNORS.



When Governors are ordered, be particular and say Governor with Stop Valve, or without Stop Valve; and either Plain or Bright Finish, as you may require, and with or without Lever Attachment. For dimensions and other particulars send for Illustrated List.

Capacity of Valve or Diameter of Steam Pipe in inches.	PRICE.			
	Plain.	Bright Finish.	Lever Attachment.	Improved Stop Valve.
1 1/2	17.00	19.00	1.00	..
2	19.00	21.00	1.00	..
2 1/2	21.00	23.00	2.00	5.00
3	23.00	25.00	2.50	6.00
3 1/2	25.00	27.00	3.00	8.00
4	27.00	29.00	3.50	10.00
4 1/2	29.00	31.00	4.00	12.00
5	31.00	33.00	4.50	14.00
5 1/2	33.00	35.00	5.00	16.00
6	35.00	37.00	5.50	18.00
6 1/2	37.00	39.00	6.00	20.00
7	39.00	41.00	6.50	22.00
7 1/2	41.00	43.00	7.00	24.00
8	43.00	45.00	7.50	26.00
8 1/2	45.00	47.00	8.00	28.00
9	47.00	49.00	8.50	30.00
9 1/2	49.00	51.00	9.00	32.00
10	51.00	53.00	9.50	34.00
10 1/2	53.00	55.00	10.00	36.00
11	55.00	57.00	10.50	38.00
11 1/2	57.00	59.00	11.00	40.00
12	59.00	61.00	11.50	42.00
12 1/2	61.00	63.00	12.00	44.00
13	63.00	65.00	12.50	46.00
13 1/2	65.00	67.00	13.00	48.00
14	67.00	69.00	13.50	50.00
14 1/2	69.00	71.00	14.00	52.00
15	71.00	73.00	14.50	54.00
15 1/2	73.00	75.00	15.00	56.00
16	75.00	77.00	15.50	58.00
16 1/2	77.00	79.00	16.00	60.00
17	79.00	81.00	16.50	62.00
17 1/2	81.00	83.00	17.00	64.00
18	83.00	85.00	17.50	66.00
18 1/2	85.00	87.00	18.00	68.00
19	87.00	89.00	18.50	70.00
19 1/2	89.00	91.00	19.00	72.00
20	91.00	93.00	19.50	74.00
20 1/2	93.00	95.00	20.00	76.00
21	95.00	97.00	20.50	78.00
21 1/2	97.00	99.00	21.00	80.00
22	99.00	101.00	21.50	82.00
22 1/2	101.00	103.00	22.00	84.00
23	103.00	105.00	22.50	86.00
23 1/2	105.00	107.00	23.00	88.00
24	107.00	109.00	23.50	90.00
24 1/2	109.00	111.00	24.00	92.00
25	111.00	113.00	24.50	94.00
25 1/2	113.00	115.00	25.00	96.00
26	115.00	117.00	25.50	98.00
26 1/2	117.00	119.00	26.00	100.00
27	119.00	121.00	26.50	102.00
27 1/2	121.00	123.00	27.00	104.00
28	123.00	125.00	27.50	106.00
28 1/2	125.00	127.00	28.00	108.00
29	127.00	129.00	28.50	110.00
29 1/2	129.00	131.00	29.00	112.00
30	131.00	133.00	29.50	114.00
30 1/2	133.00	135.00	30.00	116.00
31	135.00	137.00	30.50	118.00
31 1/2	137.00	139.00	31.00	120.00
32	139.00	141.00	31.50	122.00
32 1/2	141.00	143.00	32.00	124.00
33	143.00	145.00	32.50	126.00
33 1/2	145.00	147.00	33.00	128.00
34	147.00	149.00	33.50	130.00
34 1/2	149.00	151.00	34.00	132.00
35	151.00	153.00	34.50	134.00
35 1/2	153.00	155.00	35.00	136.00
36	155.00	157.00	35.50	138.00
36 1/2	157.00	159.00	36.00	140.00
37	159.00	161.00	36.50	142.00
37 1/2	161.00	163.00	37.00	144.00
38	163.00	165.00	37.50	146.00
38 1/2	165.00	167.00	38.00	148.00
39	167.00	169.00	38.50	150.00
39 1/2	169.00	171.00	39.00	152.00
40	171.00	173.00	39.50	154.00
40 1/2	173.00	175.00	40.00	156.00
41	175.00	177.00	40.50	158.00
41 1/2	177.00	179.00	41.00	160.00
42	179.00	181.00	41.50	162.00
42 1/2	181.00	183.00	42.00	164.00
43	183.00	185.00	42.50	166.00
43 1/2	185.00	187.00	43.00	168.00
44	187.00	189.00	43.50	170.00
44 1/2	189.00	191.00	44.00	172.00
45	191.00	193.00	44.50	174.00
45 1/2	193.00	195.00	45.00	176.00
46	195.00	197.00	45.50	178.00
46 1/2	197.00	199.00	46.00	180.00
47	199.00	201.00	46.50	182.00
47 1/2	201.00	203.00	47.00	184.00
48	203.00	205.00	47.50	186.00
48 1/2	205.00	207.00	48.00	188.00
49	207.00	209.00	48.50	190.00
49 1/2	209.00	211.00	49.00	192.00
50	211.00	213.00	49.50	194.00
50 1/2	213.00	215.00	50.00	196.00
51	215.00	217.00	50.50	198.00
51 1/2	217.00	219.00	51.00	200.00
52	219.00	221.00	51.50	202.00
52 1/2	221.00	223.00	52.00	204.00
53	223.00	225.00	52.50	206.00
53 1/2	225.00	227.00	53.00	208.00
54	227.00	229.00	53.50	210.00
54 1/2	229.00	231.00	54.00	212.00
55	231.00	233.00	54.50	214.00
55 1/2	233.00	235.00	55.00	216.00
56	235.00	237.00	55.50	218.00
56 1/2	237.00	239.00	56.00	220.00
57	239.00	241.00	56.50	222.00
57 1/2	241.00	243.00	57.00	224.00
58	243.00	245.00	57.50	226.00
58 1/2	245.00	247.00	58.00	228.00
59	247.00	249.00	58.50	230.00
59 1/2	249.00	251.00	59.00	232.00
60	251.00	253.00	59.50	234.00
60 1/2	253.00	255.00	60.00	236.00
61	255.00	257.00	60.50	238.00
61 1/2	257.00	259.00	61.00	240.00
62	259.00	261.00	61.50	242.00
62 1/2	261.00	263.00	62.00	244.00
63	263.00	265.00	62.50	246.00
63 1/2	265.00	267.00	63.00	248.00
64	267.00	269.00	63.50	250.00
64 1/2	269.00	271.00	64.00	252.00
65	271.00	273.00	64.50	254.00
65 1/2	273.00	275.00	65.00	256.00
66	275.00	277.00	65.50	258.00
66 1/2	277.00	279.00	66.00	260.00
67	279.00	281.00	66.50	262.00
67 1/2	281.00	283.00	67.00	264.00
68	283.00	285.00	67.50	266.00
68 1/2	285.00	287.00	68.00	268.00
69	287.00	289.00	68.50	270.00
69 1/2	289.00	291.00	69.00	272.00
70	291.00	293.00	69.50	274.00
70 1/2	293.00	295.00	70.00	276.00
71	295.00	297.00	70.50	278.00
71 1/2	297.00	299.00	71.00	280.00
72	299.00	301.00	71.50	282.00
72 1/2	301.00	303.00	72.00	284.00
73	303.00	305.00	72.50	286.00
73 1/2	305.00	307.00	73.00	288.00
74	307.00	309.00	73.50	290.00
74 1/2	309.00	311.00	74.00	292.00
75	311.00	313.00	74.50	294.00
75 1/2	313.00	315.00	75.00	296.00
76	315.00	317.00	75.50	298.00
76 1/2	317.00	319.00	76.00	300.00
77	319.00	321.00	76.50	302.00
77 1/2	321.00	323.00	77.00	304.00
78	323.00	325.00	77.50	306.00
78 1/2	325.00	327.00	78.00	308.00
79	327.00	329.00	78.50	310.00
79 1/2	329.00	331.00	79.00	312.00
80	331.00	333.00	79.50	314.00
80 1/2	333.00	335.00	80.00	316.00
81	335.00	337.00	80.50	318.00
81 1/2	337.00	339.00	81.00	320.00
82	339.00	341.00	81.50	322.00
82 1/2	341.00	343.00	82.00	324.00
83	343.00	345.00	82.50	326.00
83 1/2	345.00	347.00	83.00	328.00
84	347.00	349.00	83.50	330.00
84 1/2	349.00	351.00	84.00	332.00
85	351.00	353.00	84.50	334.00
85 1/2	353.00	355.00	85.00	336.00
86	355.00	357.00	85.50	338.00
86 1/2	357.00	359.00	86.00	340.00
87	359.00	361.00	86.50	342.00
87 1/2	361.00	363.00	87.00	344.00
88	363.00	365.00	87.50	346.00
88 1/2	365.00	367.00	88.00	348.00
89	367.00	369.00	88.50	350.00
89 1/2	369.00	371.00	89.00	352.00
90	371.00	373.00	89.50	354.00
90 1/2	373.00	375.00	90.00	356.00
91	375.00	377.00	90.50	358.00
91 1/2	377.00	379.00	91.00	360.00
92	379.00	381.00	91.50	362.00
92 1/2	381.00	383.00	92.00	364.00
93	383.00	385.00	92.50	366.00
93 1/2	385.00	387.00	93.00	368.00
94	387.00	389.00	93.50	370.00
94 1/2	389.00	391.00	94.00	372.00
95	391.00	393.00	94.50	374.00
95 1/2	393.00	395.00	95.00	376.00
96	395.00	397.00	95.50	378.00
96 1/2	397.00	399.00	96.00	380.00
97	399.00	401.00	96.50	382.00
97 1/2	401.00	403.00	97.00	384.00
98	403.00	405.00	97.50	386.00
98 1/2	405.00	407.00	98.00	388.00
99	407.00	409.00	98.50	390.00
99 1/2	409.00	411.00	99.00	392.00
100	411.00	413.00	99.50	394.00
100 1/2	413.00	415.00	100.00	396.00

No Charge for Boxing & Cartage.

It is a common method to advertise Governors without cost, unless satisfactory to the customer, and then charge High Prices for doing what any good Governor will do. Various Governors inferior to the "Judson" are sold in this way, operating well enough for three months, to insure collection of the pay, but becoming useless after a year's wear—their construction lacking durability. The Judson Governor is guaranteed to be not only the best Regulator of Steam Engines, but also the most durable Governor made. Parties in buying other Governors should stipulate that their durability be guaranteed, and should also take care that they do not, for much inferior governors,



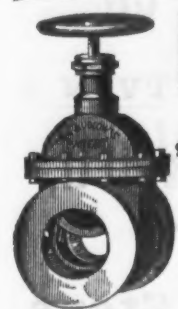
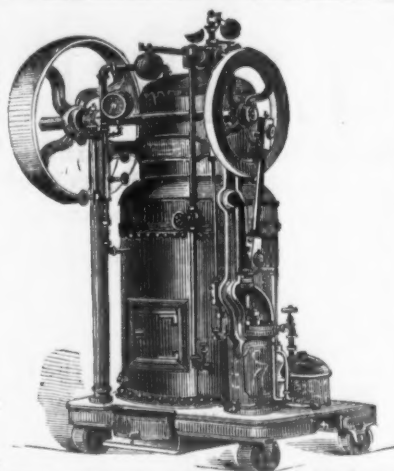
## Machinery, &amp;c.

THE  
Shapley Engine

Patented Feb. 10, 1874.

COMPACT,  
PRACTICAL,  
DURABLE,  
ECONOMICAL.  
\$200.00.Cheaper than any Engine offered of  
the same capacity.

MANUFACTURED BY

SHAPLEY & WELLS,  
Binghamton Iron Works,  
Binghamton, N. Y.Manufacturers of Steam Engines, Boilers, Water Wheels, Circular Saw Mills and  
Mill Work generally.

## Ludlow Valve Mfg. Co.,

OFFICE AND WORKS:

938 to 954 River St. &amp; 67 to 83 Vail Ave., Troy, N. Y.,

## VALVES

(Double and Single Gate, 1/2 in. to 48 in.—outside and inside Screws, Indicator, &c.)  
for Gas, Water and Steam. Send for Circular.

Also FIRE HYDRANTS.

## BUSH HILL IRON WORKS,

Corner 16th & Buttonwood Streets  
PHILADELPHIA.

## JAMES MOORE,

(Successor to MATTHEWS &amp; MOORE,)

Engineer, Machinist, Founder and Boilermaker

CASTINGS of every description.

ROLLING MILL AND FURNACE EQUIPMENTS COMPLETE

Rolls Turned for Rails, Beams, Angles, and all shapes for Iron, Steel, or  
Composition Metals.Sugar Mill, Saw Mill and Grist Mill Machinery,  
AND MILLWRIGHTING IN GENERAL.BOILERS—FLUE, TUBULAR AND CYLINDER, and all kinds of  
TANK AND PLATE IRON WORK.WILSON MANUFACTURING COMPANY.,  
NEW LONDON, CONN.

MANUFACTURERS OF

## SOLID BOX VISES.

With or without Convex and Concave Washers.

Jackscrews, Braces, Coffee Mills, Turning Lathes, Clamp  
Heads and Screws; Parallel Bench Vises, Nash Pullies, Ho  
House Pulleys, Composition Cocks, Bench Screws, Flat Screws,  
Gridirons, Drill Stocks and Bows, Box Chisels, Holes,  
Shafters, Block Pins, Composition Roller and Iron Bushings,  
Riggers' Screws, Caulkers' Tools, Pump Chambers, Belaying  
Pins, Marlin Spikes, Malleable Iron Castings, and General  
Hardware.

GALVANIZING DONE TO ORDER.

WILSON MFG. COMPANY,

Warehouse 97 Chambers and 81 Reade Streets, N. Y.

## RICHARD DUDGEON,

No. 24 Columbia Street, New York,

MAKER AND PATENTER OF

## Hydraulic Jacks and Punches,

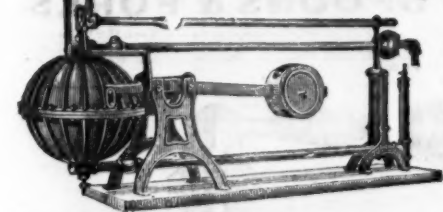
ROLLER TUBE EXPANDERS

And Direct-Acting Steam Hammers.

Communications by letter will receive prompt attention.

JACKS for Pressing on Car Wheels or CRANK PINS made to order

## The Albany Steam Trap.

This Trap automatically drains the water of  
condensation from Heating Coils, and  
returns the same to the Boiler whether the Coils  
are above or below the water level in Boiler, thus  
doing away with pumps and other mechanical  
devices for such purposes. Apply toAlbany Steam Trap Company,  
Albany, N. Y.

Birmingham, England.

## SAMUEL A. GODDARD &amp; CO.,

Commission Merchants and General Agents,  
execute orders for British manufacturers on the lowest  
terms, and collect and forward goods for a very mod-  
erate payment. Agents for the sale of North Star  
Forge Iron of a standard quality.Agents: Hibbard & Spencer, Chicago; Excelsior  
Mfg. Co., St. Louis; John Nardo & Co., Milwaukee;  
George Fitch, Denver; Nelson & Co., Burlington, Iowa;  
Marshall Lefferts, Jr., N. Y.; J. S. Brown & Co., Galves-  
ton, Texas.

## Machinery, &amp;c.

Established 1848.

## WM. SELLERS &amp; CO.,

1600 Hamilton Street, PHILADELPHIA.,

Engineers, Iron Founders and Machinists.

RAILWAY SHOP EQUIPMENTS.

Our Steam Hammers, Lathes, Planers, Drills and Bolt Cutters  
Are of Improved and Patented Construction.Railway Turning and Transfer Tables,  
SHAFTING & MILL GEARING, a specialty.

## Pivot Bridges.

GIFFARD'S INJECTOR--IMPROVED, SELF-ADJUSTING.

FAIRMOUNT MACHINE WORKS,  
Office, 2106 WOOD ST., Philadelphia.  
Manufactures as Specialties  
**POWER LOOMS,**  
SPOOLING, BEAMING, DYEING and  
Sizing Machines.  
**PATENT BOBBIN WINDING MACHINES**  
wind direct from  
bank or skein to shuttle bobbin.  
**SHAFTING**  
With Patent Adjustable self-oiling Bearings.  
Adjustable Self-Oiling Hangers,  
8, 10, 12, 15 and 18 in. drop,  
Ball and Socket Self-Oiling Pillow Blocks.  
Pulleys, from 4 inch to 10 feet in diameter.  
Pulleys made in two parts,  
any size required.  
SELF-ACTING WOOL-SCOURING MACHINES,  
LARD AND PARAFFINE OIL PRESSES.  
Improved  
**Power Hoisting Machines.**  
Machine and Foundry Work in all  
their branches.  
Plans taken, and Factories fitted out com-  
plete with shafting and Gearing  
Send for list of Pulleys, &c.  
THOMAS WOOD.



Issues Policies of Insurance after a careful inspection of the Boilers!

COVERING ALL LOSS OR DAMAGE TO

Boilers, Buildings and Machinery,

ARISING FROM

## STEAM BOILER EXPLOSIONS.

The Business of the Company includes all kinds of STEAM BOILERS

Full information concerning the plan of the Company's operations can be obtained at the

COMPANY'S OFFICE, HARTFORD, CONN.,

or at any Agency.

J. M. ALLEN, Pres. W. B. FRANKLIN, Vice-Pres. J. B. PIERCE, Sec.

Board of Directors:

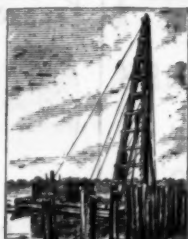
J. M. ALLEN, President.  
LUCIUS J. HENDEE, Pres't Etina Fire Ins. Co.  
FRANK W. CHENEY, Asst Treas. Cheney Brothers  
SILK Manufacturing Co.  
CHARLES M. BEACH, of Beach & Co.  
DANIEL PHILLIPS, of Adams Express Co.  
GEO. M. BARTHOLOMEW, Pres't Amer. Nat'l Bank.  
RICHARD W. H. JARVIS, Pres't Colt's Fire Arms  
Manufacturing Co.  
THOMAS O. ENDEIS, Sec. Etina Life Ins. Co.  
LEVERETT BRAINARD, of Case, Lockwood & Brain-  
ard.

GEN. WM. B. FRANKLIN, Vice Pres't Colt's Pat. Fire  
Arms Mfg. Co.  
AUSTIN DUNHAM, Pres't Willimantic Linn Co.  
GEO. CHOMPTON, Crompton Loom Works, Worcester.  
EARL P. MASON, Pres't For. & Wm. R. R. Fm.  
WILLIAM ADAMSON, of Baeder, Adamson & Co.,  
Philadelphia.  
WM. B. BEMENT, of Wm. B. Bement & Co., Phila.  
HON. THOS. TALBOT, Ex-Governor of Mass.  
C. W. FREELAND, Treas. Dwight Manufacturing Co.,  
Boston.

## THE AMERICAN DREDGING CO.



PATENT IMPROVED HOPPER DREDGE.



STEAM PILE DRIVER WITH PATENT PILE-DRIVER.



IMPROVED DIPPER DREDGE.

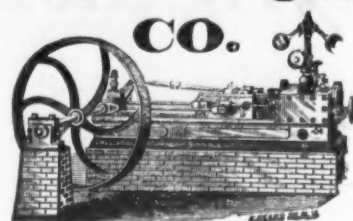
BUILDERS OF STEAM DREDGING MACHINES,  
GUNPOWDER PILE-DRIVERS, &c.

CONTRACTORS FOR

IMPROVING RIVERS AND HARBORS,  
EXCAVATING CANALS,  
RECLAIMING AND FILLING LOW LANDS,  
PILING FOR FOUNDATIONS, PIERS, Etc.

Offices, No. 10 South Delaware Ave., Philad'a.

## Machinery, &amp;c.

UTICA  
Steam Engine

(FORMERLY WOOD &amp; MANN.)

STATIONARY &amp; PORTABLE

## STEAM ENGINES

The best and Most Complete Assortment  
the Market.

These Engines have always maintained the very highest  
standard of excellence. We make the manufacture of  
Engines, Boilers and Saw Mills a specialty. We have  
the largest and most complete works in the country  
with machinery specially adapted to the work.  
We keep constantly in process large numbers of En-  
gines, which we furnish at the very lowest prices and of  
the most perfect construction. We build Engines specially adapted  
to Mines, Saw Mills, Grist Mills, Paper Mills, Cotton  
Gins, Threshers and all classes of manufacturing.  
We are now building the celebrated Lane Circular Saw  
Mill, the best and most complete saw mill ever invented.  
We make the manufacture of saw Mill Outfits a  
special feature of our business, and can furnish com-  
plete on the shortest notice.  
Our aim in all cases is to furnish the best machinery  
in the market, and work absolutely unequalled for de-  
sign, economy and strength.  
Send for Circular and Price List.

UTICA STEAM ENGINE CO.,  
UTICA, N. Y.

The Hartford Foundry &amp; Machine Co

Successors to the

Woodruff &amp; Beach Iron Works,

HARTFORD, CONN.

J. S. Hunter, Pres't. E. J. Murphy, Treas. &amp; Sec.

High and Low Pressure Marine &amp; Stationary

## STEAM ENGINES AND BOILERS,

Mining, Powder & Paper Mill Machinery,  
And every variety of Iron and Composition Castings  
made to order.

The following are a portion of the Engines manufac-  
tured at these works, and are a sufficient guarantee of  
our capacity for doing first-class work, viz.: The Pump-  
ing Engines in the cities of Brooklyn, N. Y.; St. Louis  
Mo. and Hartford, Conn. and in the Charlestown, Mass.  
and Norfolk, Va. Navy Yards, and the engines in the  
U. S. Steam Sloop of War Michigan, Kearsage, Man-  
itou, Minnetonka and Pleasants and the Gun Boat  
Cayuga, Pequot and Neponset, the Government Transports  
Dudley Buck and Geo. C. Collins, and the Steamships  
America and United States. Also the large Horizontal  
Engine for the new Plate Mill of the Bay State Iron Co.

AQUOMETER  
Steam Pump.Highest Premium awarded by  
Franklin Institute, 1874.For Simplicity, Economy of  
Construction & Efficiency.An absolutely Durable, Cheap, Efficient and Eco-  
nomical Steam Pump. Requires no special care or  
lubricating. Warranted. Address for circulars,AQUOMETER STEAM PUMP CO.,  
10 South Dela. Avenue, Philadelphia.

## LE COUNT'S

## Pat. Machinists' Tools.

REDUCED PRICES.

Set Iron Dogs, 3/4 to 2 in. . . . . \$ 5.00  
" " 2 1/2 to 4 in. . . . . " 12.00  
" Steel " 3/4 to 2 in. . . . . " 6.00  
" " 2 1/2 to 4 in. . . . . " 13.00

Iron and Steel Clamps, Die

Dogs, Clamp Dogs,

Vise Clamps, Expanding Mandrels, &amp;c.

Send for latest Price Lists to

C. W. LE COUNT,

South Norwalk, Conn.

The Frazer Axle Grease  
and Lubricator.

A pure Lubricator, free from water, gum or sedi-  
ment. The best article made for Wagons, Open  
Journals, Cog Wheels, Rollers and wherever  
a Solid Lubricator or Grease can be applied.  
Put up in Boxes, Kegs and Barrels. For prices see  
New York Price List in this paper.  
Established 10 years.

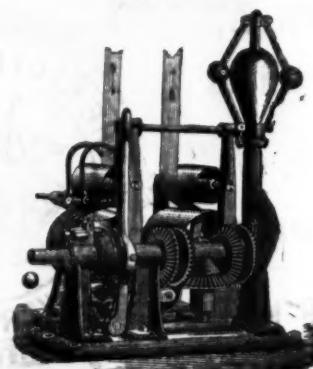
Frazer Lubricator Company,

104 Maiden Lane, New York.

## DIFFERENTIAL GOVERNOR.

The HARTFORD GOVERNOR CO.

Sole makers of the

Weaver Differential Governor.  
FOR WATER.Powerful, positive, radically new, efficient and  
working with complete success. Write for circular,  
etc., to  
HARTFORD, CONN.



## TUBAL SMELTING WORKS, 700 South Broad Street, PHILADELPHIA. PAUL S. REEVES, MANUFACTURER OF ANTI-FRICTION METALS.

XXX Genuine.....40c  
XX.....35c  
X.....30c  
A.....25c  
B.....20c

C.....50c  
D.....45c  
E.....40c  
F.....35c

"Note."—The above are my standard mixtures, and have given satisfaction wherever used, but I am prepared to make Anti-Friction Metal of any quality or mixture desired by the purchaser.

BRASS CASTINGS, 21 to 30c.  
INGOT BRASS, 19 to 25c.  
BRASS TURNINGS AND OLD METALS WANTED.

ESTABLISHED 1842.

## WM. & HARVEY ROWLAND, PHILADELPHIA,

P. O. Address: Frankford, Philad'a. MANUFACTURERS OF ALL KINDS OF

## Elliptic, Platform AND C Springs,

MADE EXCLUSIVELY FROM

SWEDISH STOCK, OIL-TEMPERED and WARRANTED.

Swedish Tire, Toe, Blister and Spring Steel.

CAST SPRING AND PLOW STEEL.  
CAST SHOVEL, HOE AND MACHINERY STEEL.OXFORD TOE, SLEIGH, TIRE AND SPRING STEEL.  
BESSEMER SHOVEL AND PLOW STEEL.  
BESSEMER MACHINERY AND CULTIVATOR STEEL.RE-ROLLED NORWAY SHAPES.  
NORWAY NAIL RODS ROLLED AND SLIT FROM SUPERIOR BRANDS

## Stearns' Circle Spoke Shave

is a new tool designed for working in small circles, and on straight work. Our ready sales for the short time they have been in the market, justify us in believing that they meet the wants of every practical wood-worker.

Send for Catalogue of 1875, also supplement 1876, and reduced Price List.

GEO. N. STEARNS &amp; CO., Syracuse, N. Y.

**BESSEMER STEEL SCREWS**

### NEWLIN & YARDLEY, PHILADELPHIA. HARDWARE JOBBERS'

Manufacturers & Manufacturers' Agents.

SOLE AGENTS FOR  
**Bessemer Steel Wood Screws  
AND ROUND  
And Flat Head Brass & Steel Screws,  
SAME PRICE AS IRON SCREWS.**

And of infinitely Superior quality—never breaking in the heads and better for all purposes.

SOLE AGENTS FOR  
**Lowman's Patent SOLID STEEL  
SHOVELS, SPADES & SCOOPS.**

Blade, Strap and Shank all one Solid Piece of Steel, outwearing two Shovels of any other make.

SOLE AGENTS FOR  
**Bessemer Steel Foundry Sieves.**

BETTER THAN BRASS AND AS CHEAP AS IRON.  
Also Importers, Jobbers and Manufacturers of  
**GENERAL HARDWARE.**

SOLE AGENTS FOR  
**Wm. Baldwin's Tools and Steel.  
Florence Tack Co.'s Tacks, Shoe and Finish-  
ing Nails, &c.  
Columbia Lock Co.'s Locks.  
Columbia Cutlery Co.'s Cutlery.  
"N. & Y." Crown Iron, Slope Crane and Brake Chain.**

**BESSEMER STEEL SCREWS**

## IRON MERCHANTS AND MANUFACTURERS.

Steam,  
Gas  
AND  
Water Work  
Supplies.

BOILER MAKERS'  
Supplies.

SALESHOOMS: 112, 114 and 116 LAKE STREET.

WORKS: MICHIGAN, KINZIE and ST. CLAIR STREETS,  
CHICAGO.Cornice  
Makers'  
Supplies.MALLEABLE, GRAY  
Iron & Brass  
CASTINGS

To Order.

## NEW TIME TABLE. Great Reduction in Time and Labor to the Farmer by using



**Nellis' Original  
HARPOON HORSE HAY FORK,**  
Grapple and Pulleys; also, Nellis' Patent Stacker and Method of conveying Hay, Straw, &c. A ton of Hay can be delivered in three to five minutes to any part of Mow or Stack. The right of Stacker and Conveyor granted FREE to the Farmer purchasing our Horse Hay Fork and Fixtures during season of 1875.

Nellis' Grapple. With it Pulleys can be attached or detached to raft or beam, without the use of a ladder.

**NELLIS' PULLEY,**  
Improved Wrought Frame, Prepared Wood Wheel. Warranted superior to any Horse Fork Pulley offered in the market.

A trial of these goods will convince any farmer that he cannot afford to dispense with them, as their entire cost is often times saved by a single day's use.

Also manufacturers of all descriptions  
Of Agricultural Steel & Iron,  
Steel Tempered by Nellis' process to suit every kind of soil.  
Prices and descriptive Catalogues of our goods furnished free. Address,  
**A. J. NELLIS & CO.,**  
Pittsburgh, Pa.  
SEMPLE, BIRGE & CO., St. Louis, Mo.  
General Agents for the Southwest.

ESTABLISHED 1840.

## R. E. DIETZ,

No. 54 &amp; 56 Fulton, and

29 &amp; 31 Cliff Street, New York,

Manufacturer of the



Each mouse caught resets the Trap for another.

## TUBULAR

And Other

## Patent Lanterns

BRASS AND IRON

## Jack Chains.

**STANLEY G. FLAGG & CO.**  
PHILADELPHIA, PA.

Office and Warehouse.

No. 216 &amp; 218 N. THIRD ST.

Manufacturers of

## STEEL CASTINGS.

A Substitute for Steel and Wrought Forgings.

Circulars sent on application.

## Steel Castings

We make Steel Castings true to pattern, sound and strong. Can be worked same as bar steel. Plowshares, Mold-boards and Land-sides, Anthracite Coal-breaker Teeth, Wheels and Pinions, Dies and Hammer Heads, Engine and Machinery Castings of all descriptions, Railroad Frogs and Crossings. Invaluable for all articles requiring great strength and durability.

Send for Circular.

**PITTSBURGH STEEL CASTING CO.,**  
PITTSBURGH, PA.

**UNIFORM SPEED**

WARRANTED THE MOST PERFECT GOVERNOR IN THE WORLD

However great or violent may be the change of load, Hewitt's governor will keep the engine running at a uniform speed.

ADDRESS: HUNTOON GOVERNOR CO., LAWRENCE, MASS.

**Do Your Own Printing!**

Press for cards, labels, envelopes, etc. Larger sizes for larger work.

Business Men do their printing and advertising, save money and increase trade. Planners and artists do their printing. The Color Press gives you great fun and makes money fast as printing. Send two stamps for full catalogue of prices, types, etc., to the Manufacturer, **KELSEY & CO.,** Meriden, Conn.



## Improved Screw Cutting Die and Holder.

This tool is particularly intended for threading stove rods rapidly and accurately, and will be useful also to carriage makers and in jobbing shops on rods three-eighths and under.

Manufactured by

**WILEY & RUSSELL MFG CO.,**  
Greenfield, Mass.

**SCRANTON Brass Works,**  
J. M. EVERHART,  
Manufacturer of Brass Work for Water, Gas and Steam. Brass Castings and Jobbing promptly attended.

**SCRANTON, PA.**

## DIXON'S PURE PLUMBAGO FOR LUBRICATING.

Put up in Boxes containing 5, 10, 25 and 50 lbs. and in barrels of 200 lbs.

This article is prepared with great care, has more body than that prepared by any other party, and is as near perfect as possible.

We were the first manufacturers to put up Plumbago as a Lubricator; and the experience of years has shown that it will save more than half the expense of oil or grease, will absolutely cool off a hot journal, and save nearly all the wear, the axes or shafts being glazed over with it, and running almost without wear. A car axle will run four or five times as long if our Lubricating Plumbago is used freely. A second-class article, however, is worse than none, because it contains a grit that will wear both the shaft and the box.

If Engineers, Experts and Purchasing Agents knew how much wear and power would be saved by its use no shaft or axle would revolve without it; every shop and car would have it at hand.

The Journal of the Franklin Institute says:

"Every one knows that for heavy machinery plumbago is a good lubricant, but every one does not always think of applying it where it would serve best. It may be of value to some of our readers to know that a planer whose bed-plate required the force of eight men to slide it when lubricated with the best ordinary material, was easily shifted with one hand when plumbago of good quality was applied."

It is pure, very finely pulverized, is free from grit, and is prepared by the most expert manufacturers of PLUMBAGO GOODS in the world. Send for envelope sample.

## THE JOS. DIXON CRUCIBLE CO.,

ORESTES CLEVELAND, President,

237, 239, 241 and 243 Railroad Ave., JERSEY CITY, N. J.  
250, 252, 254 and 256 Wayne Street,

## Russell, Burdsall & Ward, PORT CHESTER, N. Y.

Manufacturers of

## Carriage, Tire, Plow, Stove AND OTHER

## BOLTS.

Carriage Bolts made from Best Square Iron, a Specialty.

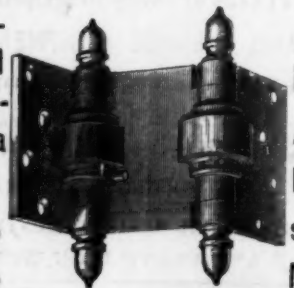
## UNION SPRING HINGES.

DOUBLE OR SINGLE ACTING.

Especially adapted for Mosquito, Fly and Screen Doors.

Size 2½x2½, Jap-  
anned, with Nickel  
Plated Springs—giv-  
ing a neat finish to a  
door.

Single Acting, Per  
Pair - - \$1.00  
Double Acting, Per  
Pair - - \$2.00



To dealers order-  
ing 4 pairs Double  
Acting, of this size,  
I will give a hand-  
some Black Walnut  
Model.

The DOUBLE ACTING UNION SPRING HINGE is the best and cheapest appliance known for swinging a light door both ways.

WAREROOMS, 79 Chambers St., N. Y.

M. W. ROBINSON, Sole Agent.



Positive transmission without stretch; runs quietly and is frictionless; better than Belts for all exposed or irregular work, or for the attachment of slats or buckets, and for Transferring Power generally.

For Information or Price List, Address,  
WESTERN DISTRICT, MIDDLE DISTRICT, EASTERN DISTRICT,  
**JNO. C. COONLEY, Pres.** **A. A. POPE, Sec.** **E. B. TUTTLE, Treas.**  
116 Lake St., Chicago. Cleveland, Ohio. 71 Broadway, N. Y.  
Fully Protected by Letters Patent in the United States and Canada.

## DERBY SILVER CO., Derby, Conn.,

Manufacture the most reliable

## SILVER PLATED SPOONS & FORKS.

They are plated by weight, and not by time or guess, containing 20 per cent. more silver than the usual standard, on a base of Nickel Silver, and finished by hand. Each article is guaranteed by the trade mark and warranted to give full satisfaction. We ask of the trade a fair and impartial test, assuring you that the high standard already attained, shall be maintained. Send for catalogue and Price.

Water Valve

Scholfield's Pat. Gauge Cock.

Water Faucet

**HENRY C. MEYER & CO.,**  
Manufacturers of  
**BRASS WORK**

For Water, Gas and Steam.  
Importers and Dealers in PLUMBERS' MATERIALS,  
46 & 48 Cliff Street, N. Y.

Specialties manufactured and controlled by us: Fuller's Patent Faucets and Mineral Water Cocks; Murdoch Hydrants and Street Washers; Flower's Open Way Valves; Scholfield's Gauge Cocks; Hair's Lock Gas Cocks. Illustrated Catalogues expressed to the trade on application, where this advertisement is referred to.